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General Articles

SOME NOTES ON CONTAGIOUS OPHTHALMIA IN CATTLE*

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This short paper is not intended to amount to anything like a comprehensive treatise; indeed, I am not even sure that the term "contagious ophthalmia" is correct when applied to the condition to be described, for when I think of the stupendous advances which have been made in recent years in nomenclature and terminology I fear that any of the old terms may be considered inexact or out-of-date. However, "contagious ophthalmia" will serve both to introduce the subject and to give the precisionist and purist a chance to hold forth.

My special interest in this subject had its birth in 1930, when an owner reported the existence of contagious ophthalmia amongst his cattle, the report being coupled with the statement that the condition appeared to be in all respects similar to the contagious ophthalmia of cattle which is well-known in South Africa, and of which the owner had had experience.

I will now proceed to give an account of what was found during the investigation which followed receipt of this information, beginning with the first of two areas in which a number of farms were found to be affected.

Area A

So far as could be discovered, the first appearance of disease was on Farm I, and there the first animals affected were in a lot of 22 young store cattle purchased from a dealer in October, 1929. Owner No. 1 stated that these animals had been on his premises for about a month before anything amiss was noticed.

The disease appears to have spread somewhat slowly through this lot of cattle during the winter and spring, and several of the home-bred stock became affected also. A veterinary surgeon was called in and various forms of treatment applied.

When I visited (on August 7th, 1930) there were no active cases on this farm, but one store beast was totally blind and another blind in one eye.

About the middle of June, 1930, the disease appeared on an adjoining farm (No. 2), and a month later there were ten animals affected in several paddocks on this farm. The affected animals were segregated, but by August 7th the number had risen to 18. These cases were all in young cattle.

On No. 3 farm, immediately to the east of No. 2, disease appeared about July 15th, 1930, and by August 7th 28 animals, all milking cows, were affected out of a total of 64 cattle. Later information announced that all this owner's cattle had had the disease by the end of August.

On another immediately adjoining farm (No. 4), on August 7th, one cow out of 40 cattle was apparently suffering from the condition, and on a fifth farm in the same immediate neighbourhood two animals were, on August 7th, similarly affected. Disease extended later to most of the cattle on these premises.

An affected heifer was moved from Farm No. 2 to another farm in the same ownership, and disease extended to other cattle there.

Enquiries were made at a number of other farms in the neighbourhood, and veterinary practitioners in the district were interviewed, but no other cases were discovered at that time (August, 1930).

Before proceeding further with the narrative, it is perhaps appropriate that a description of the condition should be given. The description which follows may be imperfect and crude. It was compiled immediately after I had seen the cases just referred to, and before I had any chance of access to works of reference. I hope that it may be taken to have the merits of its defects in that it embodies only what was seen during examinations made under ordinary farm conditions, supplemented by information given by veterinary practitioners, owners and attendants.

SYMPTOMS AND COURSE OF THE DISEASE

The first symptom is that of excessive lachrymation from one or both eyes. The discharge of tears is very copious and is accompanied by redness and congestion of the blood vessels of the conjunctiva. Opacity of the cornea appears at an early stage: it was present in one animal said to have been noticed affected for two days only, and in two others at four days. Even in treated cases the conjunctivitis may continue for three weeks.

* Presented to the West of Scotland Division, N.V.M.A., at Glasgow, November 22nd, 1933.

In none of the cases seen by me did the discharge tend to become muco-purulent or to adhere to the skin round the eye. It should be noted that all but one of the active cases (then) seen by me had been treated by the application of a 1 : 1,000 solution of perchloride of mercury twice daily.

Constitutional disturbance seems to be very slight or absent, except that in milch cows there is said to be some decline in the milk yield.

The only other symptoms are those, such as shaking of the head, arising out of pain or irritation.

Early treatment appears in most cases to prevent the opacity from becoming very dense. In the earlier cases of these outbreaks which had been left untreated the opacity was more complete than in the later (treated) cases.

One owner was particularly diligent in her attention to treatment, and opacity was less noticeable in her animals than in those on other farms, though disease spread rapidly through her stock. There was no attempt at segregation on this farm.

One or both eyes may be affected. An animal may appear to have a second attack after an interval, but it is probable that most of these cases are not due to re-infection, but that symptoms have become more manifest after a period of comparative quiescence. (Possibly these were cases in which treatment had ceased at too early a stage.)

In some cases opacity is dense and extends over the whole surface of the cornea, but in the slighter cases there is usually a small centre of dense opacity surrounded by an area in which the opacity gets less dense as it recedes from the centre, gradually shading off to normal cornea.

Owners described what appeared to be ulceration of the cornea as sometimes occurring, and it is quite likely that it does, though I did not detect actual ulceration in any of the animals I examined. [Since this original account was written I have seen several instances of ulceration of the cornea in connection with this ophthalmia.]

When the acute inflammatory stage is over, the eye in most cases clears up gradually, leaving, in the slighter cases, only a small speck on the cornea, but some animals are left with a permanent opacity sufficient to cause blindness.

From the way in which the disease spread in the locality there appeared to be no doubt as to its contagious nature, and probably the chief agents in the spread are flies. Disease on Farm No. I began in the winter months, when the cattle were housed and when there were few flies about. The progress through the herd was slow and there is no evidence that it extended from these premises until June. After that the pace quickened and disease spread from field to field and from farm to farm (following the course of the prevailing wind, but not necessarily influenced by it). There seemed to be no tendency to "jump" any great distance, which supports the idea that the fly may be the chief agent of spread, taking also into consideration the fact that there was no general spread until the advent of the fly season. Infection of one animal by another during the winter months (as on Farm I) appeared to require close contact.

It is interesting to note that on Farm No. 2 an affected animal was removed from a bunch of seven young cattle, and the remaining six were still free from disease three weeks later.

Practitioners in the district were interviewed. No other cases of similar nature had come to their notice. All had seen occasional cases of ophthalmia in cattle, usually attributed to a blow or a foreign body in the eye, but nothing which had the characteristics of a contagious disease.

An ophthalmia of sheep, affecting a number of animals at the same time, had been known in the county for years. It had occurred from time to time on various farms, did not seem to have been regarded as a serious matter, and had not shown any tendency to spread from flock to flock.

Sheep on Farm No. 2 running with affected cattle, remained free from ophthalmia. Horses in the same pastures had also remained free.

Area B

I will now give a short account of a series of outbreaks in another area, visited a few weeks later than Area A. The two areas are about 40 miles apart.

The 22 young cattle which appeared to have started disease in Area A had been supplied by a dealer and came from ten different and widely separated places of origin. All these were traced, and in the course of tracing no evidence of the existence of ophthalmia was found on the actual premises from which the animals came. However, in the course of enquiry the vendor of three of the animals gave the information that there had been contagious eye trouble on a large farm in the vicinity. Subsequent enquiries revealed that a contagious ophthalmia existed on at least five premises within a very limited area, and the condition appeared to have all the characteristics of that encountered in Area A, including the tendency to spread from farm to farm.

It became evident that disease had existed in this district prior to the removal of the three calves which formed part of the lot which introduced disease into Area A.

That disease was limited to a small area was confirmed by information given by practitioners and others, and by direct enquiry on farms in the neighbourhood.

On one large dairy farm in this area over a hundred animals were said to have been affected. Disease was first brought to this farm in a lot of 36 heifers which had been grazing on land adjacent to another farm where disease had previously existed.

On one farm in this area the owner stated that disease had first appeared in mid-winter, and that the first-affected animals were young calves, some of which showed signs of being affected within three days of birth. All the young stock were affected, but the milch cows remained free until early summer, when eight out of 20 had the disease.

During the same summer (1930) I was on three farms in another district where cattle were affected with ophthalmia, but in these there was, so far as could be ascertained, no connection between the cases and no spread from farm to farm.

Since 1930 I have, at intervals, seen and heard of several cases in a part of the country not remote from Area A, but in these disease seems to have been limited, as a result of early treatment possibly, or perhaps other circumstances, to comparatively few animals and there was no obvious "farm to farm" spread.

In connection with the first series of outbreaks, laboratory attempts to reproduce the disease experimentally failed, both when swabs from active field cases were used and also when actual affected animals from the field were put in contact with animals at the laboratory.

In spite of these negative experimental results, I think the account I have given does not leave much room for doubt as to the contagious nature of the condition.

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Outbreaks of contagious ophthalmia of cattle in various parts of the world have been recorded in veterinary literature. I do not pretend to give anything like a complete list, but will mention a few articles which have appeared on this subject.

Canham, in 1923, contributed an article to *The Veterinary Journal* (Vol. 79, p. 389) dealing with the disease in South Africa, where the question is complicated by the prevalence of *Filaria lachrymalis*, a common parasite which apparently does not always produce symptoms.

Daille, in an article on "Contagious or Epizoötic Keratitis in Bovines" (*Rév. Vét. Toulouse*, Vol. 72, 1920, No. 1), written after a visit to U.S.A. in 1919, stated that at that time the disease was raging with intensity in North America. France was obtaining cattle for herd replenishments in the devastated regions and disease was brought in with these animals, but before that date it had already been observed in France.

Daille also stated that ophthalmia in bovines had been reported in Russia, Germany and Central Europe generally and in practically every state in the U.S.A.

Jones and Little, of the Rockefeller Institute, investigated an outbreak in Ohio in 1922, and recovered an organism—a short plump bacillus with rounded ends—with which they reproduced the disease (*J. Exp. Med.*, Vol. 38). At first the ophthalmia was thought to be a local manifestation of *B. bovisepticus* infection. The condition was accompanied by a thick yellow discharge which gathered at the inner canthus. The eyelids were thickened and palpation of the lids caused considerable discomfort. In a few instances irregular shallow ulcers were found on the cornea, and in three cases there was corneal opacity.

I doubt if the condition investigated by Jones and Little was the same as that which I have described. I have not encountered cases with a thick yellow discharge, and in untreated cases corneal opacity was fairly constant.

Penberthy, in a short article (*J. of Comparative Pathology and Therapeutics*, 1897, Vol. 10, p. 263), relates that he encountered a contagious ophthalmia in cattle in 1892-95-96. He instances a case which occurred in 1896 in which four in a herd of 50 young cattle were found affected and a fortnight later 40 were affected.

TREATMENT

Whatever treatment may be followed, affected animals should, if possible, be segregated, preferably under cover.

The principal treatment adopted in the cases which I have described was the application to the eyes of a solution of perchloride of mercury, 1 : 1,000. Application was repeated twice or thrice daily. Possibly this solution is on the strong side, and for repeated application it might be as well to use a rather weaker solution, say 1 : 1,200.

Application was effected by turning the animal's head so that the affected eye faced upwards (more or less) and then pouring the solution on from a narrow-necked bottle. This somewhat crude method seemed to be fairly effective.

A colleague informs me that a solution of the double cyanide of mercury and zinc has been used with success.

I know from personal experience that a 1 : 4,000 solution of mercury cyanide proved very effective in a case of ophthalmia in man, being preferable to the perchloride solution.

Arsenical preparations applied to the eye are also said to give good results.

Penberthy, in the article to which allusion has already been made, recommended that the eyes be thoroughly sponged with a solution of sulphate or chloride of zinc, borate of soda, weak nitrate of silver or some such collyrium, for two or three days, after which boracic oint-

ment or nitrate of mercury ointment diluted with vaseline should be applied.

Canham's best results were obtained by using formalin (1:300), provided no ulceration was present. If ulceration was present then a 2 per cent. solution of hyposulphite of soda or physiological saline solution, warmed in both cases, with about 5 minims of tincture of opium to the ounce, gave good results, and in the later stages yellow oxide of mercury or calomel was used. If pannus was present a 4 per cent. solution of alum was used.

It will be seen that there is plenty of choice as to substances to be used in treatment. Probably it would be as well to vary the treatment by changing from one to another after two or three days. I should have a preference for perchloride or cyanide of mercury in the early stages.

Whatever is used, application should be regular, and in the type of case which I have seen it should be kept up for some days after the acute symptoms have subsided. This will usually mean that treatment should be continued for about three weeks. It is possible that if a method could be devised whereby there could be a continuous application of the remedy to the eye, the period of necessity for treatment might be appreciably shortened, and I hope that in the course of the discussion on this paper someone will be able to suggest a practicable, improved method.

At least one vaccine has been put on the market, but I am unable to say what it is or how it works.

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There are some difficulties when one comes to try to assess the importance of this condition. It is clear that in some countries a contagious bovine ophthalmia has been widespread and has given considerable trouble. As regards the occurrence of contagious ophthalmia in cattle in Great Britain, I have discussed the question with a number of members of our profession. Some have never encountered it, others say that it is a common condition and nothing to worry about. It is admittedly not a deadly affair (though I have heard of one outbreak which occurred in England some years ago where three cows were said to have died from septicæmia following corneal ulceration), but a herd at the height of infection is not a pleasant sight for the owner. Treatment involves a great deal of labour and time—one owner said it was as much trouble as milking—and although as a disease the condition may only take rank somewhere after the second class, it is certainly a first-class nuisance.

When its prevalence in some countries abroad is taken into consideration, outbreaks such as those described early in this paper must give rise to a degree of anxiety. There seemed to be a possibility that a new scourge had been introduced into this country—something which might perhaps develop into a widespread epidemic. Fortunately, subsequent events have reduced any such fears, but at the same time there would seem to be potentialities in outbreaks of that kind. Probably the condition is one which in this country requires certain combinations of circumstances before it spreads very readily, and that these circumstances do not often prevail or do not prevail for long periods.

I think that a practitioner who comes across what appears to be a contagious ophthalmia in cattle in this country should bear the possibilities in mind, and, especially if he encounters a series of connected cases, should consider the advisability of calling the attention of the appropriate Government Department to the circumstances. While previous experience does not suggest any great cause for alarm, there might be danger in looking on the matter too lightly.

Discussion

Mr. P. Meikle, in opening the discussion, thanked the essayist for a most interesting paper. It was certainly interesting to learn that a condition such as described had been seen in this country; personally, he had never encountered anything like it, only odd cases of ophthalmia which could generally be accounted for by injury. He had seen a type of contagious ophthalmia in Black Face tups.

Mr. A. Sillars said that in 1927 he had two outbreaks of an infectious ophthalmia, which must have been the same condition as described by the essayist.

If treated early the opacity generally cleared up; if untreated there was an opacity left. He used chinosol.

Mr. W. L. Weipers remarked that as a student he had seen a similar condition in young calves which had never been outside; the condition occurring in the spring. The symptoms shown were opacity with some ulceration. These cases were seen in the same area as those described by Mr. Sillars.

Mr. J. G. McGregor asked what proportion of infection there was in one eye.

Had there been any bacteriological report issued; if so, what bacilli had been found?

Mr. D. Campbell apologised for arriving rather late and so missing most of what must have been an interesting paper. He wondered if any of the deeper structures of the eye had been involved. Had there been any suggestion of using a preventive vaccine, or would the cost not be warranted?

Mr. H. H. Brodie suggested that the condition might be comparable to Egyptian ophthalmia brought on by bad hygiene, or from a leucorrhœa. He thought that zinc sulphate, 4½ gr. to the ounce, was the best eye dressing.

Mr. A. Cruickshank asked if calves could suffer from a pre-natal infectious ophthalmia, such as was seen among lambs and kittens.

Mr. W. Watt referred to a type of ophthalmia seen at landing ports which generally cleared up in a few days.

Professor G. W. Weir thanked the essayist and

said that as he listened to the paper he was comparing in his mind's eye a condition seen in horses—specific ophthalmia. Whereas in cattle, however, it appeared to have little effect on the system and left little or no permanent damage, in the horse there were a rise in temperature, opacity of the cornea and lachrymation which generally cleared up in a few days. This condition usually recurred and the animal was left with cataract in one or both eyes and became stone blind. As he had seen the condition, it occurred in Percherons and, never having seen this condition in civil practice prior to the War, he wondered if it had been imported from America.

There was a big choice of dressings; personally he would be doubtful of using perchloride of mercury and would prefer to use the cyanide.

Mr. W. Anderson agreed with what Professor Weir had said; in his experience Lugol's solution had been used, injected intra-orbitally, but it probably did more harm than good and gave the animal a good deal of pain. He had never seen the contagious form of ophthalmia in cattle.

Mr. Jas. McFarlane had no experience of the contagious form of ophthalmia in cattle, but had seen an outbreak in Leicester sheep.

Mr. Jas. Taylor (President) said that there was little he could add, but he wished to thank Mr. Brown for bringing forward a subject which had promoted such a good discussion and which was new to most of them. He was glad to hear that there was little likelihood of the condition becoming a scourge, and so adding to the list of scheduled diseases.

The Reply

Mr. Esmond Brown, in his reply, thanked the members for the way in which they had discussed his small effort. It was more than he had hoped for, and he had been amply repaid for the little trouble he had taken in writing out the substance of the data he had collected. Points of view and matters of interest had cropped up which he could bear in mind for future use.

With regard to one or two of the questions raised, he would deal first with the proportion of eyes affected; in the majority of cases it was one eye only. There was no bacterial report to submit, as sufficient material had not yet been examined. There was no evidence of *Filaria lachrymalis*. Blindness was not a common sequel; some took a while to clear up, but generally made a complete recovery.

In reply to Mr. Campbell's query regarding vaccination, he understood that there was a proprietary vaccine on the market, but he could see little reason for using a vaccine. Only in one instance did the disease resemble ophthalmia neonatorum; in this particular instance all the calves were affected within three days of birth. He could not agree with Mr. Brodie that dirty premises had any bearing on the question of the spread of the disease, as it appeared in animals in fields and spread rapidly. Moreover, on none of the affected farms could one say that the premises were dirty; one farm was a model farm and really run on model lines. The Port blindness may be due to ammonia.

With regard to the comparison of this condition with specific ophthalmia in horses, the only point of resemblance was the ophthalmia and opacity of the cornea; otherwise, the course of the disease was entirely different: there was no appreciable systemic reaction and no cataract formed.

The drop in the milk yield referred to, it was learned, was in common with that of other herds in the district which were not affected.

It was difficult to say what deep structures of the eye had been affected, as no opportunity had presented itself for making a *post-mortem*, and it was not easy to establish this fact from a superficial examination.

ACORN POISONING

G. N. GOULD (Junr.), m.r.c.v.s.
and
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During the autumn an unusually large number of cases of acorn poisoning occurred in the New Forest area following an exceptionally abundant crop of acorns, which was estimated by old residents to be the heaviest within memory.

Treatment of severe cases was not very successful, and, in consequence, a search of all available literature was made for details of the condition and suggestions as to treatment. The paucity of recorded clinical observation and of suggestions as to treatment was surprising, and therefore the following information is given in the hope that it will prove of general interest and lead to further discussion on this condition, which appears to be still included among "obscure diseases."

The ingestion of acorns by cattle appears to vary in its effects, depending upon whether they are swallowed whole or whether they are chewed. It has been a common experience to go into cowsheds and notice that the whole herd of milking cows are passing fæces containing very considerable quantities of chewed acorns and showing no untoward effects beyond a drop in their usual milk yield, varying from 2 lbs. per day to as much as 10 lbs., in spite of a continuance of the ordinary balanced ration.

Examination of the fæces shows them to be mucilaginous in consistence and to contain a large quantity of, apparently, undigested kernel of acorns.

More serious effects are marked by a sudden diminution of milk yield, tendency to recumbency, inappetence—both for food (except acorns) and water—repeated passage of small quantities of fæces, followed by complete cessation of defæcation. The cow appears bright and is not obviously ill. If turned out to pasture she will walk about and seek acorns in the hedgerows or beneath the trees and eat them with avidity, whereas previously she had refused all food offered to her.

In contra-distinction to the recorded observations of several observers, the ingestion of acorns has been noticed to be very common even when there was ample herbage and other foods available. The cows appear to take a great liking to them, and this liking rapidly becomes a positive craving—the cows having been noticed to walk about searching for acorns in

preference to any other available food. If acorns are not available the cow will often ingest soil or take an occasional mouthful of grass and then stand up for a while motionless. After a varying period she will continue her search.

It is further recorded that acorns have been responsible for serious losses in cattle not over two years old, whereas it has been noticed that in the cases from which this report is compiled most of the affected animals were mature milking cows.

In two cases a marked feature for two days in one case and three days in another was regurgitation of a mass of whole acorns with a small quantity of hay or grass a few minutes after swallowing the latter. One cow in two days regurgitated two large pailsful of this mixture of hay and acorns. She subsequently recovered. The other cow in which this feature was noticed died.

The temperature, pulse and respiration remain about normal, or slightly subnormal. There is a tendency to repeated recumbency, which is noticed to increase in frequency and duration as the condition progresses. The cow is noticed to stretch herself frequently, especially on rising, in the early stages of the disease: this is probably an indication of abdominal discomfort. There appears to be an almost complete absence of apparent abdominal pain except in the later stages of the disease. Occasionally a slight paddling has been noticed, and grunting, but these features were not marked, except towards the end.

On rectal examination the bowel is found to "cling" to the arm—the feeling being reminiscent of that experienced in volvulus in the horse. The bowels appear empty; the rumen full and in a condition of stasis.

Straining to defæcate is not noticed, and except in the later stages flatulence is not a usual feature. A thick discharge from the eyes and nose is usually noticed and the eyes appear sunken, especially as the condition becomes advanced.

Fatal results are ushered in by an increased and more prolonged tendency to recumbency, followed by the onset of flatulence, which is associated with considerable abdominal pain. The cow rapidly weakens, the temperature becomes subnormal, the pulse small, weak and running down, the respirations become laboured —apparently as a result of hypostatic congestion of the lungs—groaning and pronounced struggling, apparently from acute abdominal pain, follow. Death is generally very sudden and usually occurs in a bout of struggling. In every fatal case except two it had proved impossible to induce any action of the bowels.

In those cases that recover the bowels act after a varying period, the fæces being black and fœtid in odour and containing a considerable quantity of acorn husk and kernel—occasionally whole acorns. Scour subsequently ensues and the appetite gradually returns both for food and water. Scour persists for a varying period up to one or two weeks in severe cases which have had copious medication. Even in cases which rapidly respond to treatment it is very noticeable that the milk yield is very slow in improving and it never reaches that given prior to the attack.

Post-mortem Appearances.—These were constant, and were as follows: The rumen and reticulum appeared normal, but contained large quantities of whole or split acorns (not crushed or chewed) amounting, in some cases, to many hundreds. Some chewed acorns were also found. The omasum was impacted with whole or crushed acorns and showed extensive hæmorrhages of the mucous membrane in five cases. The ingested contents were very dry and the organ had a leathery appearance. The abomasum and the intestines were devoid of solid ingesta, containing a dark, fœtid hæmorrhagic fluid, the mucous membrane being inflamed and showing hæmorrhages.

TREATMENT

Eight fatalities were experienced and several times this number of cases treated—the majority being mild or observed at the very early stages, before stasis had become complete and after the owner had been warned not to administer saline purgatives. In early cases starvation, except for water, for 24 hours with copious oleaginous purgatives and subcutaneous injections of liq. strychninæ usually effected a fairly rapid cure.

In cases seen a day or two after the onset of stasis, and especially those in which saline purgatives—red drenches, etc.—had been administered, death was the usual result. Saline purgatives appeared, from experience gained in this record of cases, to be almost invariably followed by fatal results and were concluded to be definitely contra-indicated.

The most satisfactory treatment proved to be copious draughts of liquid paraffin—giving half to one gallon daily. This proved superior to linseed oil, being less nauseating and not followed in recovered cases by such profuse or prolonged scour. Liq. strychninæ subcutaneously and the administration of diffusible stimulants in milk or mucilage also proved of value. A plentiful supply of fresh water was given. The cows did not exhibit thirst—rather to the contrary—but frequently rinsed the mouth and occasionally swallowed a very small quantity of water. Linseed tea and milk, in those cases in which the animal would drink it, was also given. Drenching with a considerable quantity of linseed tea, etc., was usually followed by the onset of pronounced abdominal pain and was not advised.

The difficult feature, even in recovered or convalescent cases, was to induce the cows to eat. They still exhibited a craving for acorns and were capricious in their appetite for any other foods. It frequently took ten to 14 days to get the cow on to its food following the disappearance of stasis. Gentian, nux vomica and sodium bicarbonate proved quite useful medicaments for this purpose, but the recovery of appetite was painfully slow.

After considerable experience of these cases the mucilaginous character of the fæces in those in which the cows were chewing the acorns and passing the apparently undigested kernels without ill effects led to the supposition that the mucilage was derived from the kernel and that it was possible that this mucilage inhibited the detrimental effects of the husk, whether due to tannin or other toxic products.

In two cases in which an appetite could not be induced an experiment was tried of feeding a small proportion of crushed acorn kernel (all husk removed) with a little bran and oats and later other foods. The cows took it readily and came fairly rapidly on to their food, making satisfactory recovery and suffering no relapse or apparent ill effects. The feeding of the kernel of acorns was then tried on two cows which had been ill for some days and shown no improvement. They were given copious quantities of split acorn kernels and took them readily, mixed with bran, although they had refused other food. In one case scour resulted in about 36 hours—whether as a result of the acorn kernel or previous medication cannot be proved. In the other case the cow was very weak when the experiment commenced, although she ate a little of the acorn kernel, but collapsed and died on the second day. Unfortunately for our purpose the wave of acorn poisoning was then disappearing and fresh cases did not present themselves for experiment.

It would seem feasible that the supposition that it is some mucilage derived from the kernel that inhibits the effects of the toxic product of the husk in those cases in which the acorn is chewed is correct, in that so many cows were seen passing these chewed acorns in tremendous quantities without ill effects.

Investigations to support or disprove this supposition would be of considerable interest.

Prophylaxis.

Measures were directed towards the discovery of affected cows early and to the prevention of access to acorns. In a herd in which a case of acorn poisoning had occurred the owners were advised to take careful note of the milk yield, and any cow showing a sudden large drop in yield was kept in and given oleaginous purgatives. In addition, they were instructed to watch for cows which kept "lying down" at intervals during the day and to see that the bowels were acting normally. These two factors were usually the first indications noticed and by taking early steps, results proved much more satisfactory.

The prevention of access to acorns presented considerable difficulties in view of the extremely large number of oak trees in and around the farms in the area affected. Keeping the animals in the byre could not be entertained on account of the expense of feeding and labour. Manual collection of acorns involved great labour, but was the most satisfactory and certain. Turning pigs out with the cattle was quite effective—the pigs ate the acorns with impunity and fattened on them, and usually would not tolerate the cattle near their feeding ground.

Rolling the acorns in with a heavy roller did not prove too successful, as those cattle which had acquired the taste for acorns would scrape up the soft earth beneath the trees and eat them. Whilst this might be efficacious if carried out early before the taste was acquired, it was found necessary to spray freely with liquid manure after rolling in the acorns to ensure that they would not still be sought with avidity by the cows. Fencing off the contaminated parts of the pastures could not be practised, except in very isolated cases, on account of the expense. This step also involved collection or other means of disposal of the acorns afterwards.

It is to be hoped that this report will prove of interest and will lead to further observations and discussion on this obscure condition.

BRITISH ZOOLOGISTS AND TEACHING OF BIOLOGY

At the annual meeting of the Association of British Zoologists progress was reported in the work of providing vacation revision classes in biology at the Universities, for school-teachers. It was stated that biological teaching is rapidly expanding in the schools, and that, as a result, teachers competent to teach biology are in demand, and the demand is always greater than the supply.

Mrs. M. D. Brindley, of Cambridge, opened a discussion on the possibility of providing some means by which information concerning the natural history of the British fauna could be made more easily and rapidly accessible. Changes in the fauna might be of importance to the community, as, for example, in the introduction of foreign animals such as the grey squirrel and the musk rat.

Professor D. M. S. Watson, of University College, London, gave his views of the nature and extent of the teaching which should be carried on in a university Department of Zoology. In order that the student may be prepared to deal with the biological problems which it will later be his duty to investigate, his teaching must be broad and must be concerned as much with the natural history and physiology of animals as with their structure. He gave an account of the way in which he has expressed these views in the design of the new buildings which have recently been built for the Department of Zoology at University College.

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RECENT ADVANCES IN THE CONTROL OF SOME DISEASES OF SHEEP

Last week we published a paper by Mr. W. S. Gordon, on "The Control of Certain Diseases of Sheep," as well as a discussion thereon. A perusal of the paper will amply repay all veterinarians because of the fund of information contained in it, for not only is it shown that many of the diseases affecting sheep in this country can be clearly defined and diagnosed, but also that suitable methods for their control have been elaborated the application of which is attended with highly successful results.

It has been long known that sheep in various parts of the country suffer from diseases which may cause losses up to 50 per cent. or over, but it has only been within the past ten years or so that concentrated efforts have been directed towards their study. So successful have been the results of the various researches that it can be safely claimed to-day that many diseases affecting the ovine species are now being successfully controlled as a direct result of such research work. In few other species of animal have such rapid strides been made in disease research or have such noteworthy results been witnessed following the preventive measures adopted. One of the most outstanding examples is lamb dysentery, a disease which less than ten years ago menaced the breeding of lambs to such an extent in some districts that it was found unprofitable to carry on such operations. Now, thanks to the perfection of methods of prevention, elaborated directly from a study of the causal agents and their action, the disease has been practically excluded in these areas. The same state of affairs exists with regard to braxy, and the excellent work on louping-ill now maturing has shown that soon this condition will be added to the list of preventable diseases. It is very gratifying to note that most of the researches into sheep diseases have been carried out by members of our profession, which simply goes to show that in the profession we have workers capable of carrying out such researches provided the facilities are afforded them.

During the discussion following Mr. Gordon's paper the following statement appears: "He had often been disappointed at the lack of knowledge shown by many practitioners in relation to ordinary sheep farming methods and at the lack of interest in many of the commoner conditions affecting sheep. It was high time the profession took more than passing notice of this important branch of its work. Veterinary practitioners were often consulted by their clients nowadays on the subject of sheep diseases, and unless they understood the practical side of sheep farming it was sometimes very difficult to assist the client in a manner he had a right to expect." Several reasons may be advanced for this state of affairs, among the most important of which are the former lack of precise knowledge on the subject and the tendency of the sheep farmers to adopt a conservative attitude regarding the various troubles experienced among their stock. To-day, however, the position is distinctly different. Research has shown the nature of the various diseases and methods for their control. Sheep farmers are acquainted with these methods and expect veterinary practitioners to be familiar with the latest discoveries. As time goes on, veterinary surgeons will be consulted more and more on these subjects, and it is to be hoped that they will take a real and lively interest in all that is discovered. It must be admitted that times are changing and that present-day veterinarians have, to some extent, made themselves acquainted with present-day problems of disease in most of our domesticated animals, but we feel that this must be carried further all the time so that we, as a profession, shall occupy our rightful position regarding the maintaining of all species of animals in a state of health.

A further point brought out in Mr. Gordon's paper was the fact that a biological product appeared, and was claimed to contain certain protective substances, but in the field and on test in the laboratory was shown to be valueless against the specific disease. Such a procedure cannot be too strongly condemned. Unfortunately, at the present moment, no legislation exists to deal with the standardisation of biological products for veterinary use. (In human medicine such products are subject to standardisation under the Therapeutic Substances Act.) The result is that it is possible for any type of material to be labelled as a preventive or cure for a specific disease condition, though containing no element capable of exerting any beneficial influence. To say the least of such a state of affairs, it is decidedly unfair to the research workers who spend their energies in devising such products and to those who do practice standardisation and only issue products carefully and thoroughly tested. In this connection many of us will recall the interesting and instructive discourse on the subject of standardisation given by Dr. Mohler, at the International Veterinary Congress in London, in 1930, when he showed the state of affairs in America prior to the introduction of the Virus Serum Toxin Law. We note that the standardisation of veterinary products will form one of the subjects of discussion next year at the International Veterinary Congress in New York. We wonder, meantime, what steps the profession is taking

in this country to put our own affairs in order before the matter is discussed internationally.

Finally, in connection with the study of diseases of sheep much valuable information applicable to diseases of other animals and human beings, is being derived. As Mr. Gordon rightly points out, sheep are specially susceptible to infection with anærobes of most types. The study of these anærobes in the sheep has a very definite bearing on anærobic infections generally and the knowledge acquired can readily be applied to all other animals. The methods of immunisation practised, *e.g.*, the transference of immunity to the lamb through the colostrum by immunising the mother, open up fields which with further work may well be used in epizoötics in other animals. We owe a lot to those who have devoted their time and energy to the study of diseases of the sheep.

From *The Veterinarian*

JANUARY, 1834

William Percivall, M.R.C.S. and V.S., lecturing at the University of London:—

"The veterinary art is but of comparatively modern introduction into this country—one that, 50 years ago, was in the hands of a set of men who were unfitted for anything that required science or art . . . Such was the barbarous or, at least, uncultivated state of the veterinary art at the time that St. Bel, a French gentleman from the veterinary school at Lyons, arrived in this country. He it was that prompted the first effort to redeem our art from the abyss of ignorance and superstition into which it had long and lowly fallen, and once more to set it on those pedestals of science upon which it had already rested, during the ages of the Greeks and Romans. Such a strong hold, however, had these descendants of Vulcan got of the art, that when St. Bel arrived in this country, in 1788, and made public proposals to teach an improved practice of it on the principles of science, his offers met with no encouragement, and he was compelled to retrace his steps to France.

"Undaunted, however, by this one unsuccessful attempt, he made another visit to England, two years afterwards; and this turned out a fortunate one. For, on this occasion, an agricultural society, the ODIHAM, a proof of their good sense and very much to their credit, gave ear to what Monsieur St. Bel had to propose, and finally resolved themselves into a body, called the Veterinary College of London, with a view to the erection of a public school, over which St. Bel was to preside. That St. Bel was a man who possessed some considerable store of medical knowledge, I believe all who knew him will admit: at the same time, everyone who stood beside him at the time he was at the College are agreed that, so far as a *veterinary* professor was wanted, he was not, to the degree that might have been expected or desired, qualified to undertake such an office. However, he held it but a very short time; hardly was the erection of the present College at St. Pancras (which was intended but as temporary and as a preliminary to something better) completed, when St. Bel died, leaving the art in but little better condition than that in which he had found it."

Clinical Reports

A SIMPLIFIED OPERATION FOR REMOVING THE DIGIT IN THE OX

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This operation is indicated in severe and protracted lameness involving one digit. Lameness may be due to primary injury of the distal phalangeal articulation which is sometimes the cause of very acute lameness without any very pronounced local reactions—severe puncture wounds and resulting infection may involve the flexor tendons and cause rupture, which results in up-turning of the toe. This condition will spread to the opposite digit unless taken in reasonable time. Neglected foot cases often require to be treated by amputation of one digit.

Generally speaking, the operation is indicated when there is: (1) Progressive enlargement of the structures above one claw, with acute lameness; (2) considerable enlargement with up-turning of the point of the claw—usually in this condition there is a suppurating wound; (3) traumatic arthritis of the distal phalangeal articulation; (4) necrosis of the pedal bone.

The operation is never necessary as long as the foot is placed on the ground and used to some slight extent.

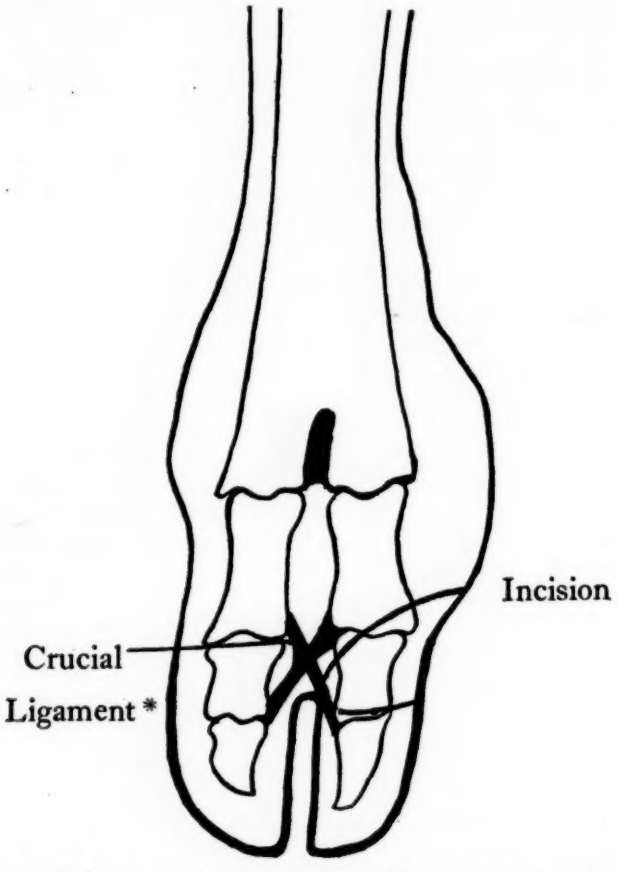
Materials Required.—Chloroform and muzzle, hobbles, rope, knife, tow, carbolic oil, bandages and disinfectant. Two assistants are all one needs.

Procedure.—The ox is cast by the Rouff method and it is a considerable advantage to have the head tied up with a halter.

The three sound legs are now secured with hobbles, and if necessary the ox is rolled over to bring the diseased digit (not necessarily the leg) uppermost.

The lame leg is now secured on top of the others in the usual way for foot operations in the recumbent position, and chloroform administered—two-ounce doses are usually well tolerated provided there is no covering of the muzzle with sacks.

The operation itself is simple. After preparing the skin, the incision is started in the interdigital space close to the diseased digit to avoid weakening the opposite member. It is carried upwards and outwards at about 45° and all the tissues incised to the bone. The incision will be found to cross the proximal interphalangeal articulation, and with a little manipulation the ligaments can be severed. No attempt is made to remove the articular surface, which will only be slightly exposed. The stump is dressed at once with carbolic oil and tow and tightly bandaged, a three-inch calico bandage being used to finish off with. The patient can now



* It is important not to injure this support for the remaining digit.

be released and, on rising, will probably use the remaining digit, which may have been out of use for months.

The surgeon's bandage must be changed in 24 hours, when there will be little danger of hæmorrhage, but it is as well to keep the wound covered for a week, with a daily dressing. After this it is best left open and dressed with a strong solution of permanganate of potash, which will result in a very good and tough extremity.

That the operation will be criticised I have no doubt, but it was arrived at for the following reasons:—

(1) The offending member is removed well up off the ground, where it is little exposed to injury.

(2) Skin flaps are not a success where there is necrosis or considerable sepsis, and good drainage is afforded by the open wound.

(3) There is no appreciable benefit to be gained by sawing off the articular surface and considerable damage may be done to the supporting crucial ligament with weakening of the remaining digit.

Usually a pronounced granulation is present in a week's time, which then requires to be dressed with a strong solution of permanganate daily to keep it in check.

Unfortunate Sequelæ.—The ox may not put the foot down again, after fully recovering from chloroform, for a fortnight. This is not to be taken as altering the prognosis, which is good.

Epistaxis occurred in one case 24 hours after the operation. The bleeding continued for eight hours and the membranes were blanched before it was finally arrested. This, I think, was due to the weak state of the ox at chloroformisation.

Considerable swelling of the leg and fetlock, if present before operation, may require subsequent treatment.

Otherwise, the operation appears to be fairly free from risk.

My only failures to date were due to:—

(1) Weakening of supporting ligaments by sawing off the articular surface. This has now been discarded.

(2) Operation delayed too long when this was attempted; necrosis had already extended to the opposite branches of the flexor tendons and the outside appearance of the foot already resembled that of a prehistoric monster.

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ACORN POISONING (?) IN THE HORSE

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An interesting case of death following the liberal ingestion of acorns was observed in a four-year-old hunter gelding. This animal had been noticed by its owner to have taken a liking to acorns. As acorns were thought to be harmless to horses he took no steps to prevent him eating them.

The horse was stabled for the night and was left apparently in good health. At five o'clock the next morning he was found seriously ill, with considerable abdominal pain, acute dysentery and progressive weakness. He died 30 minutes later, before any veterinary attention could be procured.

Post-mortem.—On *post-mortem* examination, lesions were found to be confined to the alimentary canal. The stomach and first part of the small intestines appeared to be normal. The whole of the large intestines showed acute inflammation of mucosa and sub-mucosa and the lumen was filled with a hæmorrhagic fluid containing a large proportion of masticated acorns.

The usual hypostatic congestion of one of the lungs was present, but otherwise no lesions were discovered.

It is to be concluded that death resulted from acorn poisoning, as there were no other abnormal *post-mortem* appearances discoverable.

A special issue of "anti-tuberculosis" stamps costing a halfpenny each, is on sale in Finland. These stamps have no postage value, but are being sold to collect funds for an intensive campaign against tuberculosis—Finland's most common disease.

Abstracts

[**The Growth Phases of Pleuro-pneumonia and Agalactia on Liquid and Solid Media.** Ledingham, J. C. G. (1933). *Jl. Path. & Bact.*, *37*, 393-410. With 4 plates (2 coloured), comprising 25 figs.; 22 refs.]

This work describes a beautifully illustrated piece of observational research carried out by Dr. Ledingham, the distinguished Director of the Lister Institute of Preventive Medicine, in an endeavour to elucidate the vexed question of the genetic relationships of the causal organism of contagious bovine pleuro-pneumonia. After nearly two years' close study, he now claims to have solved definitively this problem of taxonomy, for his observations reveal that the rather bewildering variety of forms seen at various stages of growth in broth media and still more clearly in impression preparations from surface colonies on solid media, after appropriate Giemsa staining, can be linked up together so that their allocation must be made to the order of mould-like bacteria, *Actinomycetales* (Buchanan, 1917, 1918).

In his earlier expressions of opinion Dr. Ledingham (*Jl. Roy. Microsc. Soc.*, 1932, **52**, 235; *Jl. Path. & Bact.*, 1933, **36**, 196) had been tempted for a time to the belief that the organism was a fungus, but was "advised by mycologists who have examined the preparations that the organism is most probably not to be ranked among the *true fungi*." Among a number of careful observers, Orskov (1927), Novak (1929, 1930) and Wroblewski (1931), who have recently studied the morphology of the organism and figured a complicated structural development, the last-named had definitely assigned it, for reasons that now do not seem to be valid, to the true fungi. Dr. Ledingham contends that in spite of its remarkable polymorphism, due largely to the plastic nature of its protoplasm and its prolific growth, the organism of pleuro-pneumonia is essentially of simple structure, and its growth can be resolved into the following successive phases:—

(1) *Germination of the Initial Corpuscle.*—Commencing with the smallest living element, which is capable of traversing the coarser bacterial filters, we note its spore-like capacity to sprout into branching filaments, which either at their ends or along their course swell up into deeply-stained nodes or beads, from which further beaded ("moniliform") growth proceeds.

(2) The beads, unlike those of a moniliform strepto-bacillus, swell up and exhibit the greatest variety in shape and size, particularly during the early stages in their development, and pale blue amorphous small plaques are seen near them.

(3) When the young colony on a solid culture medium is in the earliest visible, or granular, stage of growth each of the above condensations, whether it be round or oval, large or small, becomes differentiated into an outer sheath and a central dot or "nucleus."

(4) After the colony has reached its full stage of development, when it comprises a clear peripheral zone and a granular central area, sprouting growth takes place from the "nucleated" bodies in precisely the same way as from the initial corpuscle, namely, by a process of frequently repeated pseudopodial budding. This explains the origin of the great mass of polymorphic units—rings, spheres, filaments, etc.—present in cultures at the period of maximum growth. There is no reason to suppose that the blue-staining outer sheath surrounding the chromatic central dot or "nucleus" in the bizarre structures noted above is anything other than the residual portion of the primary protoplasm after the chromatic element has become separated off and consolidated; it is a feature which can be demonstrated by the Giemsa stain in fully developed rods of any moniliform strepto-bacillus.

The above four well-marked phases are then followed by involution and degeneration changes, particularly in the centre of the colony, where asteroid forms, showing an intensely stained protoplasm and presenting several pseudopodial processes, are numerous, together with many other curious-looking forms with similar processes. It is most likely that these odd structures retain the power of further multiplication.

The organism of contagious agalactia of sheep and goats (a disease which is probably identical with some forms of the contagious pleuro-pneumonia of sheep and goats reported in other countries, but has impressed French observers most probably by the earliest chief symptom noticeable in milch goats, namely, cessation of the milk yield) was found to undergo identical development in all essential respects. This organism was first grown in culture by Bridre and Donatien at Tunis, in 1923, and was then claimed by them to show the same morphology as the pleuro-penumonia organism.

There is no reason why the study undertaken by Dr. Ledingham, which does not depart in any way from the simple methods of orthodox bacteriology, could not have been undertaken at any time during the last 30 years—in fact, at any time since the first isolation of the pleuro-pneumonia parasite in culture by the French workers, Nocard and Roux, with their assistants, in 1898, and the elaboration of the now commonly employed method of delicate differential staining by Giemsa in 1904. Of recent years, however, because of the relegation of the organism to the category of "viruses"—for it

passes some of the coarser earthenware filters that keep back ordinary bacteria—there has been a tendency to make great mystery of its structure. And so it has come about that studies upon its morphology by "advanced" methods of microscopy (dark ground illumination, ultra-violet light microphotography) have been undertaken as a stepping stone to bids at great discovery in the realm of "virus" disease, as, for example, by Frosch, in Frosch and Dahmen's (1923) reported cultivation of the foot-and-mouth virus, and Barnard, in Gye and Barnard's (1925) work on the cultivation of living agents from avian and mammalian growths. These authors seem to have disregarded the work of former careful bacteriologists upon the morphology of the organism, namely, Bordet (1909, 1910), who clearly described the fine wavy threads, spheres and rings in culture after staining them with the Giemsa stain, and Borrel and his colleagues (1910), who figured the branching filaments and asters. Frosch seems to have been of the opinion that the structures seen by these authors were medium artefacts, while Barnard, who made no reference to their work, pictured by his methods a growth cycle which was essentially one of simple budding. Commenting upon Barnard's mode of study, Dr. Ledingham declares that "it is clear that no satisfying conception of the growth phases can be obtained by such methods."

The question further arises as to how far the accurate morphological observations recorded by Dr. Ledingham can be taken as a check to the theoretical estimations made by Dr. Elford and his co-workers upon the size of viruses by their methods of filtering suspensions through collodion membranes of graded pore diameter. Some of the fine filaments depicted by Dr. Ledingham ran up to 25μ in length, the largest of the "nucleated" bodies drawn measures 20μ × 4μ, and centrifuged deposits from Berkefeld V filtrates showed initial spore-like corpuscles, the smallest of which was of the order of 0·3μ and even some short threads attaining a length of 4μ. In these deposits there was also some particulate débris (0·2μ or less). Barnard (1925), by his methods referred to above, claimed that the diameter of the smallest particle which could initiate growth was 0·25μ, and Elford (1929), by his graded filtration methods, first held the size of such a particle to be 0·1μ-0·15μ, while the larger ones ("spheroids") attained 0·175μ-0·25μ. Dr. Ledingham maintains that none of the small particles of the size assigned to them by Elford could initiate growth, and hazards the suggestion that some of the larger plastic spheroids referred to by him must have slipped through his membranes. "In view of the plastic nature of these pleuro-pneumonia elements, a fact to which all workers have drawn attention, it is reasonable to doubt whether the measurements of these elements can be made with the same degree of precision we are entitled to expect in the case of the more rigid elementary bodies of which similar studies have been reported."

Dealing finally with the genetic relationships of the pleuro-pneumonia and agalactia parasites, Dr. Ledingham states that both organisms can be quite appropriately enrolled in the family *Actinomycetaceæ*, belonging to the order *Actinomycetales*. This order now includes four genera, *Actinobacillus, Leptotrichia, Actinomyces* and *Erysipelothrix*—in other words, organisms which are of the greatest importance to the veterinary worker, comprising the two kinds of actinomycosis parasites and the bacillus of swine erysipelas. The descriptions he gives of the growth phases of the pleuro-pneumonia and agalactia organisms are indeed curiously reminiscent of those dictated to generations of veterinary students upon the features of *Actinomyces*, in lesions and in culture. The importance of filterability as a differential character of the pleuro-pneumonia and agalactia organisms is probably of doubtful value in view of the frankly microscopically visible elements to which the filterable element can give rise, and the explanation of the filterability may be found to lie in an unusual plasticity of protoplasmic structure. "A new genus must certainly be set up to include these two organisms as species, but whatever generic name is proposed, its distinguishing characters are not likely to diverge very fundamentally from those of *Actinomyces*."

J. T. E.

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[Metabolic Disturbances of Cattle. Sjollema, B. *Acta. vet. Neerland, 1,* 2.]

(*Continued from No.* 1, *p.* 21.)

Phosphaturia in Indigestion in Cattle.—The author has found that phosphaturia is common in indigestion in cattle, the urine containing 50 to 150 times the normal amount of phosphorus (2,000 to 6,000 mg. P_2O_5 per litre instead of 40-50 mg.).

This phosphaturia could be produced experimentally by the giving of oils.

The Analytical Basis for the Investigation of Milk Fever and Grass Tetany.—The author here describes the development and results of his biochemical tests in his analysis of blood and urine from cases of milk fever and grass tetany. The significant fact about the blood minerals is the characteristic change and proportion between Ca, Mg and P. The results have been published previously and have been confirmed by other biochemists.

This section contains tables and charts showing the blood mineral analysis of normal cows and cows affected with milk fever and grass tetany.

Significance of the Results of Analysis in the Etiology and Pathogenesis of Milk Fever.—*A. The Blood Calcium.*—The blood Ca depends on four main causes—Ca content in the food, absorption from the intestine, the vitamin D content of the food and the mechanism by which Ca in the body is stored and utilised. Low blood Ca is not limited to milk fever, but occurs also in other disorders having no clinical resemblance to milk fever, *e.g.*, in osteomalacia. Low Ca also occurs during heavy lactation in cows otherwise normal. It appears that nutrition has but slight effect on the incidence of milk fever. The pathogenesis of the low blood Ca of milk fever is discussed. It is known that hypofunction of the parathyroids can lower the blood Ca and that milk fever is curable by parathyroid extract. The milk fever syndrome, however, does not resemble that following extirpation of the parathyroids, in which case tetany is prominent. Also, these glands are typically normal in cows dead of milk fever. Low blood Ca may also be associated with great ovarian activity, but no significant evidence of a connection between this and milk fever has been found.

Investigation into the *p*H of the blood and the free CO_2 and bicarbonate would perhaps bring more light on the problem.

In spite of the limited knowledge available, the author states his opinion that low Ca has an etiological connection with milk fever; he believes that the diffusible Ca (ion) is of more importance than the total Ca and that the Ca/Mg ratio is of special significance.

B. The Blood Phosphorus.—An abnormally low blood P content is nearly as regular as low Ca in milk fever, but, in comparison with known aphosphoritic diseases, it appears to have no particular significance *per se.*

C. The Blood Magnesium.—This is always raised in milk fever and lowered in grass tetany. This factor is discussed in detail in a later chapter (*q.v.*).

D. Other Blood Constituents.—In addition to Ca, P and Mg, the blood of milk fever cases has also been examined for potassium, sodium, chlorine, urea, sugar, acetone, cholesterin, creatin and creatinine, the alkali reserve and the *p*H; they have all been found more or less normal in milk fever cases.

The Composition of the Blood and the State of the Autonomic Nervous System at the Period of Parturition.—*A. The Composition of the Blood.*—The author analysed the blood of a number of parturient cows in order to find out the normal fluctuation in blood constituents at the calving period. The results showed that the Ca may fall from the normal amount of about 9·4 mg. per cent. by as much as 2 mg. per cent., *i.e.*, to 7·4 mg. per cent., without any sign of milk fever. Ca ion falls more than the total Ca and is lowest about 33 hours after calving. Ca usually falls appreciably in the hours before parturition. The work produced no evidence that the act of milking has any great effect on liability to milk fever. Blood sugar rises about 20 per cent. at parturition and blood acetone slightly so.

B. The Autonomic Nervous System.—As far as our limited knowledge allows, it appears that, from the author's researches, there occurs a state of vagotony just before parturition; it disappears after calving. Sjollema considers that the curative effect of $CaCl_2$ (etc.) injections in milk fever is brought about by stimulation of the autonomic nervous system and not by a direct chemical action. This view is supported by the success of udder inflation, which brings no Ca into the system.

The Influence of the Blood Ca/Mg Ratio as Determined by Experimental Alteration of this Relationship.—The author experimented on various cattle of different ages and caused an artificial drop in their blood Ca by injecting intravenously sodium oxalate with or without subsequent injections of $MgCl_2$ or $MgSo_4$. Oxalate combines with part of the blood Ca and causes a fall in the Ca/Mg ratio, which is further intensified by the Mg injections. The result of this is narcosis in the test animal, which can be quickly revived by Ca injection. [In grass tetany the Ca/Mg ratio is high, with the opposite syndrome.] This experimental work gives valuable evidence towards the theory of the pathogenesis of the diseases under review.

The Influence of Intravenous Injections of Salts, which Combine with Calcium or Inhibit the Ionisation of Calcium, on the Bovine Body.—Sodium oxalate given intravenously in a dose of 17 mg. per kg. body weight causes an immediate drop in the blood Ca (down to 3 mg. per cent., which is the minimum obtainable in this way). The pulse is accelerated for a short time and then slowed, and the animal shows less sensibility to mechanical stimuli, a tendency to limb paralysis, muscular twitches and accelerated respiration. The progress with blood analyses of some cases is described. One heifer died quickly after receiving a large amount of oxalate, showing dyspnœa and clonic cramp (Ca 3·3 mg. per cent.) Autopsy revealed hyperæmic parathyroids. J. E.

(*To be continued.*)

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[The Relationship between Cutaneous and Gastric Habronemiases of the Horse. (Trans. title.) Descazeaux and Morel. *Bull. de l'Acad. Vét. de France, 6,* 8, 364-367.]

For the diagnosis of gastric Habronemiasis the writers place eggs of the house fly, *Musca domestica,* in fresh fæces from suspected horses. Adult flies developing from eggs reared in infected fæces will be found to harbour *Habronema* larvæ.

H. muscæ was found to be a common parasite

in some districts. Horses suffering from severe "summer sores" were found to have a massive infestation by *H. megastomum*, those with benign sores harbouring fewer. In experiments to try and convert a simple sore into a "summer sore" the results were always positive when the infesting larvæ were those of *H. megastomum*, but with the larvæ of *H. muscæ* a negative result was obtained.

The adults of *H. megastomum* are capable of causing adenomatous tumour formation in the stomach, while the lesions caused by *H. muscæ* and *H. megastomum* are discrete and superficial.

Prophylaxis depends upon the prevention of parasitic infestation of the flies and the re-infestation of horses by parasitised flies. The following measures have been adopted: the screening of all windows to exclude flies, and the closing of all doors from sunrise to sunset, droppings being collected twice a day—very early in the morning and at dark.

The treatment of sores with a pommade or glycerine solution of Novarsenobenzol is recommended.

J. S.

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[The Biological Diagnosis of Equine Gastric Habronemiasis. (Trans. title.) Descazeaux and Morel. (1933). *Bull. Soc. de Path. exotique, 26,* 8, 1010-1014.]

There are three species of *Habronema*, a spirurid genus of nematodes, which live as adults in the stomach of the horse. Two species are normally found attached to the mucosa; the third lives in nodules in the mucosa. All three have a complex life-history involving an early stage within the bodies of house flies or stable flies. While the adults have little or no pathogenic significance, the larvæ have been held responsible for a condition of the skin known as "summer sores" or "granular dermatitis," and also for a nodular bronchitis.

Prophylaxis is usually based on control of the flies. Treatment directed against the adults might be possible were it not for the fact that, in the absence of gastric symptoms, diagnosis cannot easily be made. The eggs are extremely difficult to find in the excrement, and hitherto the only reliable diagnostic technique was that of Hodkings (1921), who recommended gastric lavage with a stomach tube, followed by microscopic examination of the sediment.

Descazeaux and Morel now recommend a biological diagnosis, whereby the fæces of a suspected horse are concentrated and used as a culture medium for the eggs of flies. The fly larvæ which hatch become infected with *Habronema* by ingesting the embryos, and after about a fortnight the characteristic infective larvæ of *Habronema* can readily be found in the proboscis-region of the now adult flies. The authors briefly describe their culture technique and the appearance of the infective *Habronema* larvæ. They suggest the application of the method to other spirurids, in domesticated animals, having a similar life-history.

B. G. P.

(Contributed by the Imperial Bureau of Agricultural Parasitology.)

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[The Control of Sclerostomiasis in Horses. (Trans. title.) Seehawer. (1933). *Zeits. für Veterinärkunde, 45,* 11, 406-422.]

Seehawer has been investigating the efficacy of various anthelmintics against the sclerostomes of horses, a common and troublesome group of nematodes in which treatment is rendered difficult from the fact that the young stages live, not in the gut, but in the mesenteric arteries, where they often provoke the formation of aneurysms. Later stages occur in nodules in the cæcal wall. Only the adult worms, free in the lumen of the cæcum, are amenable to treatment by ordinary anthelmintics given *per os.*

The author has therefore injected numerous antimony compounds into infested foals. Antimosan, Stibosan and certain commercial solutions of antimony in both its trivalent and pentavalent forms (composition not stated) were tried, but all were found to be inferior to tartar emetic and to be of negligible significance in the control of sclerostomes.

Carbon tetrachloride and tetrachlorethylene were also tried, given through a nasopharyngeal sound; using this method the toxic symptoms usually associated with these drugs were avoided. Tetrachlorethylene, although a valuable remedy for ascarids and gastrid larvæ, was found to be practically useless against sclerostomes. Carbon tetrachloride, on the other hand, gave good results, especially when combined with intravenous injections of tartar emetic.

The author discusses the macroscopic and microscopic appearance of the gut in infested horses and gives tables showing body-weights and egg-counts before and after treatment. The paper implicitly emphasises the important fact that a given anthelmintic is effective only against certain helminths, and that the nature of the helminths present in a given host must therefore be determined before treatment is begun.

B. G. P.

(Contributed by the Imperial Bureau of Agricultural Parasitology.)

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[Observations upon several Cases of Paralysis in the Mare. (Trans. title.) Bussinger, C., and Richou, R. (1933). *Recueil de Méd. Vét. de l'Ecole d'Alfort, 109,* 10, 602-606.]

The author describes eight cases of paralysis

in mares at the end of gestation on separate farms and occurring within two months in 1931.

The chief symptoms were sudden onset, and rapid evolution of the disease, shown by paralysis of the hind quarters, alterations in the genito-urinary organs (more or less marked congestion of the vaginal mucous membrane, swelling of the lips of the vulva, which were œdematous and even turgid, and incontinence of urine); no loss of appetite, and usually no fever; no disturbance of digestion, respiration or circulation at the start of the trouble, and very rapid emaciation to a skeletal condition.

The author likens the condition to that described as infectious paralysis by Comény and said to be due to streptococci, but differing in two important features: (1) No infectious characteristic was shown, and (2) no alterations in the urine itself were found. (In Comény's cases the urine was a greyish-yellow, cloudy and viscid.)

A predisposing cause would appear to be numerous previous gestations, *plus* bad nourishment (the 1930 season was exceptionally bad for hay making). Slinging the animal was apparently the most important measure of treatment. No medicine tried was found effective. The mortality of mares was 50 per cent. and recovery required long convalescence. All foals, except one, soon died. Fatal relapses may occur (in one case after several weeks and in another after about one year.)

C. V. W.

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[**A Case of Necrobacillosis in a Horse.** Clarenberg, A., and van Heelsbergen, T. *Tierärztliche Rundschau* (1933). *39*, 20.]

The authors describe in detail the macroscopic and microscopic alterations present in the liver and lungs of a horse due to infection by *B. necrophorus.*

In the liver were observed greyish-yellow, sharply defined areas, circular in outline but sometimes confluent and varying in size up to that of a tennis ball. The larger lesions showed softening of the centre, whilst a zone of congestion was usually present round the smaller ones. Similar necrotic areas were widely distributed throughout the lung.

By appropriate staining the bacilli were readily discernible, being very numerous round the edge of the lesions.

It is suggested that in such instances the method of infection is *via* the intestine, but since *B. necrophorus* is probably a normal inhabitant of the intestinal contents, the latter organ must be in some way unhealthy at the time.

According to the authors, the pathogenicity of the organism for humans does not seem to have been established.

N. S. B.

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[*OLLULANUS TRICUSPIS* **Causing a Chronic Gastritis in Pigs.** (Trans. title.) Kotlan, A., and Mócsy, J. v. (1933). *Deuts. tierärztl. Woch., 41*, 44, 689-692.]

Ollulanus tricuspis is a parasite of the stomach of domestic cats. It was discovered and named by Leuckart in 1865, but has been found only rarely since then. Cameron found it fairly commonly in cats in Edinburgh, elucidated the life-history, and described the pathology: Lewis found it in 18 out of 155 cats in Wales. Probably it is fairly common and is overlooked because of the few symptoms it produces.

Kotlán and Mócsy have now recorded it from the stomach of four pigs in Hungary, where it has never appeared before, even in cats. In discussing the clinical picture and *post-mortem* findings, the authors point out that only the stomach showed pathological changes, although other nematodes were present in the intestine. By feeding material to cats they obtained slight infections with Ollulanus but, curiously, pigs were negative to experimental feeding. The parasite, which is described and figured, appears to be very pathogenic in pigs.

Among the other nematodes found in the pigs is included *Trichostrongylus instabilis* [= *T. colubriformis*], a parasite normally found in sheep and goats and not hitherto recorded from pigs.

B. G. P.

(Contributed by the Imperial Bureau of Agricultural Parasitology.)

ANTHRAX IN NORTHAMPTONSHIRE

The Northamptonshire Agricultural Committee, at their meeting on December 16th, were recommended by the Diseases of Animals Sub-Committee to inform the Ministry of Agriculture that they were of the opinion that the circumstances in connection with the series of deaths from anthrax at the Lodge Farm, New Duston, required special investigation by the Ministry and that also they were of the opinion that the Ministry should take steps with a view to the institution of research and the prevention of anthrax.

The Sub-Committee stated that Supt. Lawrence, of the County Police, had submitted detailed reports of the outbreaks, and the one regarding the outbreak at Messrs. Linnell's farm at Duston stated that the nine animals which died from the disease had been fed solely on grass, and that there had been three previous outbreaks in the four fields in which the cattle had originally grazed. Eight cattle which had been grazed in other fields remained healthy. The six cattle which died at Manor Farm, Hanging Houghton, had all been fed solely on grass, as had 31 other beasts. In this case there was no reliable information as to previous outbreaks in the same field.

A report submitted by Mr. C. W. Crofts, M.R.C.V.S., said that it had been demonstrated for a long time that the spores of the disease could remain active in the ground over a long period, and Mr. E. P. Thorne, M.R C.V.S., of the Ministry, expressed the opinion that the danger of further outbreaks of the disease on fields in which it had previously existed might be mitigated by grazing on them animals less liable to infection than cattle nearing maturity.

Reports

CENTRAL PROVINCES AND BERAR [INDIA]

ANNUAL REPORTS ON THE WORKING OF THE CIVIL VETERINARY DEPARTMENT FOR THE YEARS ENDING MARCH 31st, 1932, AND MARCH 31st, 1933*

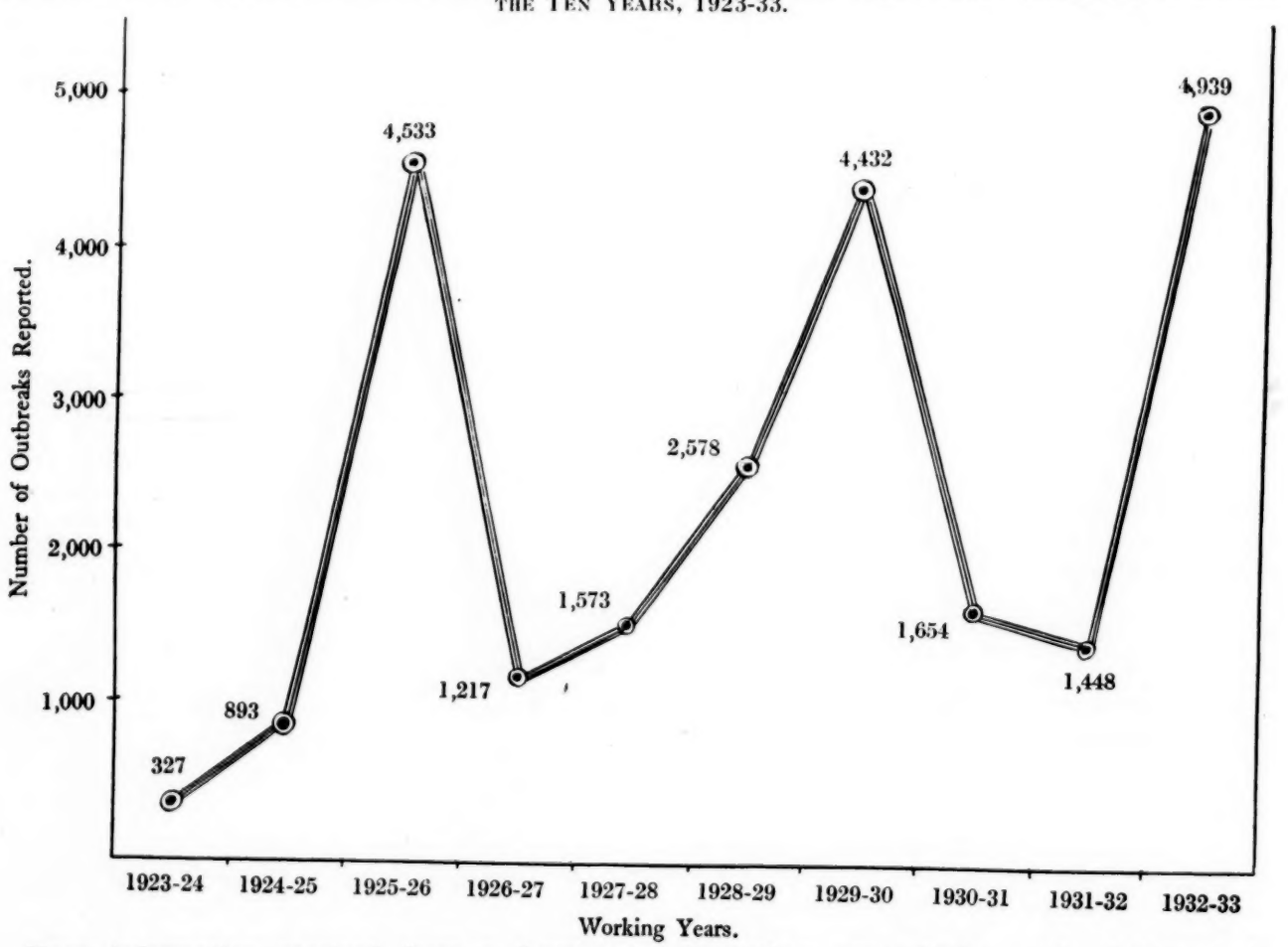
These two short administrative reports for the successive years 1931-32 and 1932-33, when they are reviewed together are of particular interest to veterinary officers who have to deal with outbreaks of contagious disease in the field and to animal ecologists inasmuch as they depict very clearly the regular periodicity of what may be regarded as perhaps the most formidable of all animal diseases, namely, cattle plague (rinderpest) and the possible economic advantages to be gained by rational forecasting.

Particularly, in the light of such knowledge, the folly of Governments in budgetting rigidly in advance for departments that execute field control and institutes that supply preventive material and research for animal disease, on the usual basis of prior average yearly expenditure becomes evident, as does also that of pruning such organisations for reasons of supposed economy during intervening periods of natural abatement in the incidence of disease.

This periodicity in the incidence of rinderpest is well shown in a chart appended to the 1932-33 report, which is reproduced, with slight modification, below :—

Central Provinces India, Civil Veterinary Department.

Chart Showing the Natural Periodicity in the Incidence of Cattle Plague (Rinderpest) During the Ten Years, 1923-33.



Upon information received from a former Director of Veterinary Services, Central Provinces, Mr. C. W. Wilson, it was stated in the report of the Muktesar Institute for the year 1925 that a cyclical rhythm of this kind, of alternating exacerbation and abatement in intensity in the waves of rinderpest, could be predicted, and at the laboratory this knowledge enabled the workers to manufacture and lay up stocks of serum in anticipation of large sudden demands from the field.

A periodicity of the same order has been closely investigated for some time by Sir Leonard Rogers and other eminent workers for the

* Major R. F. Stirling, F.R.C.V.S., I.V.S., Director of Veterinary Services. 12 pp. + 14 tables; 13 pp. + 14 tables + 1 chart. Nagpur: Govt. Ptg.

severe human epidemics, such as cholera and plague, in India. In this country, the recent striking contributions of C. Elton, of the Bureau of Animal Population, at Oxford, upon the enormous fluctuations that occur periodically in wild animal populations, such as among field voles, are most significant also as showing the wide implications of this phase of comparative pathology.

While the working year 1931-32 was therefore a relatively mild one so far as cattle disease was concerned in the Central Provinces, the following year was a very unhealthy one—"a rinderpest year" (it is called in the report)—as could be anticipated.

> 1931-32.—"The disease (rinderpest) prevailed throughout the province in a mild form, claiming 9,332 victims only as against 12,144 of last year, the outbreaks recorded being 1,448 as against 1,654."
>
> 1932-33.—"The disease appeared in a virulent and widespread form in Saugor, Hoshangabad, Chhindwara and Nagpur districts, while the four districts of Berar and Chanda suffered the least. Saugor and Hoshangabad are, as it were, the gateways for the ingress of outside cattle into the province. Repeated inoculation of large herds has had to be resorted to in these areas to keep the disease under control. Mortality owing to rinderpest alone was 31,807 in 4,939 outbreaks, against 9,332 in 1,448 outbreaks last year."

This cyclical periodicity in the occurrence of severe rinderpest in endemic territories does not seem to be peculiar to India. In India, the cycle would appear to extend over approximately three-and-a-half years. To the reviewer's recollection it was, for instance, commented upon by Mr. F. R. Brandt, Chief Veterinary Officer to the Northern Territories, Nigeria, in his Annual Report for the year 1920. The cycle he briefly mentioned was, however, somewhat longer, about five years, and he attributed the phenomenon, probably with good reason, to the time required for susceptible progeny from the survivors of a preceding period of severity to increase in sufficient numbers to provide fuel, as it were, for a subsequent conflagration.

An explanation of this kind was put forward to account for the ebb and flow of human measles in London, when this remarkable phenomenon was first brought clearly to light by Sir William Hamer 27 years ago. We have it, however, on the high authority of Professor Major Greenwood* that subsequent more exhaustive mathematical investigation of the statistical evidence (Soper, Stocks) has shown that although the explanation may account for much, it does not cover all the facts by any means.

The advances made in devising methods of control for this disease in the Central Provinces were recently the subject of an annotation in the *Record* (November 4th, p. 1136). According to the reports under review, the resources of the department were largely expended, as in the past, in attempts to check mortality by preventive inoculation of large numbers of cattle in the scene of outbreaks with serum, in the manner which had been customary *faute de mieux* in India for many years. A campaign had been started, however, just before the period under review, to confer upon numbers of cattle a more solid and durable immunity by the usual serum-simultaneous method, but its cost was soon found to be prohibitive. Recourse was then had to inoculation of cattle with live virus only, without simultaneous serum, the virus having been attenuated (as was found in work at the Muktesar Institute) in virulence for cattle by prolonged passage through goats. The naturally relatively resistant cattle of India did not stand in need of a simultaneous safeguarding dose of serum in this operation. The hope is expressed in the reports that this method may be found, in the peculiar conditions of India, to be "the one method suitable and efficient for the control of rinderpest in years to come." One aim has been to create by this method immune belts around centres of infection, and, as was mentioned in the annotation, another has been to immunise under powers conferred by legal enactment all cattle imported into the province at certain seasons of the year and liable to spread infection along their routes of travel.

During both of the years under report, other cattle epidemics — foot-and-mouth disease, anthrax, and hæmorrhagic septicæmia—prevailed in a rather severe form. There was a good deal of mortality following upon foot-and-mouth disease among young stock owing to the onset of complications. Against anthrax, protective inoculation with anti-serum was adopted. The disease in India does not seem to be generally so severely endemic—or, at any rate, to manifest itself so fatally—as to warrant active immunisation (with spore vaccine, for example) as is now adopted on a large scale in certain countries like South Africa, Argentina and Australia. Nevertheless, it might seem that this view is a paradox, for the so-called East Indian imported hides and hair have a very bad reputation in respect of this infection. Hæmorrhagic septicæmia levied a toll that was second only to that of rinderpest, and the field staff were heavily engaged in combating the disease, by inoculation of vaccine in known endemic areas

* *Vide* Discussion on Presidential Address by Sir William Hamer, M.D., entitled "Further Considerations Regarding the Characteristic Features of Influenza Waves" delivered at the Section of Epidemiology and State Medicine of the Royal Society of Medicine, October 27th, 1933.—*Proceedings* (1933), 27, 5-17.

or of anti-serum in the scene of outbreaks. It is said that "the results of vaccination against this disease were all that could be desired and it is regrettable that owing to shortage of funds more cattle could not be protected."

Satisfactory progress is also recorded in the control of blackquarter, which in the past has caused severe mortality among young stock in certain villages during the rainy season. Hence, a policy of inoculating as many susceptible animals as possible in these areas in June, before the advent of the endemic season, has been adopted. In 1931-32, 51,744 cattle were inoculated with the so-called "aggressin" in this way, and in 1932-33, 29,451. Some were also inoculated with serum, or aggressin and serum, apparently when exposed to imminent infection. The information seems to show that the system has caused marked diminution in the number of outbreaks and in mortality, and that stock owners press for the inoculation of their cattle by the method.

Piroplasmosis (apparently babesiasis, caused by *Babesia bigemina*) affects cattle ubiquitously in the province, and, it is reported, causes much chronic ill-health, with emaciation. For this debilitating condition, inoculation with trypan blue is claimed to be an excellent remedy; solutions of this drug, ready prepared, are despatched to the field in large quantities from the headquarters laboratory for inoculation.

Among other activities reported, there may be mentioned the castration annually of over 100,000 bulls; the formation in Nagpur of a Society for the Prevention of Cruelty to Animals, and the assistance given by the department in official rural uplift schemes.

A Veterinary Investigation Officer, Mr. Bachan Singh, M.R.C.V.S., was recruited to the department during the second year under review. Rai Saheb R. V. Pillai, the Deputy Director, officiated for Major Stirling for some time during the latter's absence on leave; both these officers and their veterinary staffs are to be congratulated upon their zeal, enterprise and efficiency.

J. T. E.

R.S.P.C.A. INSPECTOR SENT FOR TRIAL

At the Thames Police Court, on Wednesday, before Mr. John Harris, Henry Harold Knight, 53, an inspector of the Royal Society for the Prevention of Cruelty to Animals, appeared on remand charged under the Prevention of Corruption Act. His address was given as Avenue Road, Acton.

Knight is alleged to have accepted, between 1930 and 1933, money from a number of persons as an inducement or reward for showing them favours. The allegations were denied.

Knight, who, through his solicitor, Mr. Fail, pleaded "Not Guilty," reserved his defence, and called no witnesses, was committed for trial. Bail was allowed.

N.V.M.A. Divisional Reports

WEST OF SCOTLAND V.M.A.*

MEETING AT GLASGOW

A meeting of the above Division was held in the Royal Hotel, Glasgow, on Wednesday, November 22nd, 1933.

The President, Mr. J. F. Taylor, occupied the chair, and the following members were present: Professor G. W. Weir, Messrs. W. Anderson, H. Begg, junr., H. H. Brodie, A. Cruickshank, W. Watt, J. G. McGregor, A. Sillars, P. McIntyre, J. M. Mitchell, P. Meikle, D. Brown, Jas. McFarlane, Esmond Brown, A. Gibb, W. L. Weipers, D. Campbell and A. Thomson, Hon. Secretary. Messrs. Forteith and W. Gowans were present as visitors.

The minutes of the last meeting, as printed in the *Record*, were adopted.

Apologies for absence were received from Professor Wm. Robb and Mr. Donald Campbell. Mr. Campbell fortunately was able to look in later.

Letters were read from the General Secretary, N.V.M.A., and the Secretary was instructed to reply.

An intimation by the Secretary of the resignation of R. Renfrew, who was a regular attender and a member of the Executive Committee, was accepted with regret. Mr. Renfrew has left the district to try his fortunes in the sunny south, and it was unanimously agreed that, in writing to accept his resignation, the Secretary should convey the best wishes of the Division to him in his new venture.

The Hon. Secretary then gave a short report of his impressions of the N.V.M.A. Congress.

Following this there was a short discussion on the menace of unqualified persons doing work which, while quite within the law, was not in the public interest, and it was resolved to ask the N.V.M.A. to insert an intimation in the Press drawing attention to the qualifications of a veterinary surgeon.

Paper.—Mr. Esmond Brown then presented a most interesting paper, entitled "Some Notes on Contagious Ophthalmia in Cattle." This was followed by a good discussion after the members had adjourned for tea. [Mr. Brown's paper and a report of the discussion are reproduced at the commencement of this issue.—Ed., *V.R.*]

Post-mortem Specimens.—It was intended that an open discussion on several points of general interest should fill in the rest of the programme, but as the paper led to a most interesting discussion there was little time left and only two interesting specimens were considered.

* Received for publication, December 20th.

One, brought by Mr. Brown, Kilwinning, was of a fracture of the ischium and sacrum in a cart-horse. The animal had fallen and, with little apparent damage, had worked for four days before showing any sign of lameness, when the leg collapsed, and the horse was unable even to be kept in slings.

Mr. McFarlane had an interesting specimen of a fracture at the upper junction of the radius and ulna and subsequent erosion of the elbow joint. He said that although there was a discharge it had no smell nor had it the characters of synovial fluid. The animal had a history of having been kicked.

Votes of Thanks.—The meeting then terminated with votes of thanks to the essayist and speakers and to the Chairman for his conduct of the proceedings.

A. Thomson, *Hon. Secretary.*

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NORTH MIDLAND VETERINARY MEDICAL ASSOCIATION*

CLINICAL DISCUSSION AT SHEFFIELD

A meeting of the above Division was held at the King's Head Hotel, Change Alley, Sheffield, on December 5th, 1933.

The President, Mr. F. C. Scott, occupied the chair, and there were also present: Messrs. Abson, Canning, Collinson, Fletcher, Green, Hudson, Johnson, Nixon, Murgatroyd, Thompson, Tullis, Walker and the Hon Secretary, Mr. W. Tweed.

Election of Officers

Officers for the ensuing year were elected as follows:—

President.—Mr. F. C. Scott (re-elected).

Vice-Presidents. — Messrs. Marrison and Walker.

Hon. Treasurer.—Mr. H. Thompson.

Hon. Secretary.—Mr. W. Tweed.

Auditors.—Messrs. Fletcher and Coward.

Council.—Messrs. Abson, Bowett, Canning, Collinson, Green and Tullis.

Arising out of the Council minutes, it was agreed that a social evening be held early in the New Year and that the arrangements be left in the hands of the President and Secretary.

Treatment of Animals of Poor Persons.—It was agreed that a flat rate fee of 5s. suggested by the R.S.P.C.A. for treatment of injured dogs, would be satisfactory, and approval was given to an alteration of the conditions of working the decentralised joint scheme for the treatment of animals of the poor. These have been forwarded to the R.S.P.C.A.

Counter-advertising.—The Hon. Secretary drew the attention of the members to a letter received from the N.V.M.A. expressing their willingness to insert a counter-advertisement in any newspaper wherein an unqualified person has advertised.

Clinical Matters

Messrs. Fletcher, Green and Scott exhibited specimens and instruments.

Messrs. Nixon and Murgatroyd opened a discussion on clinical cases by describing a series of interesting cases met with in their practices.

Mr. Fletcher (Sheffield) exhibited a specimen of intussusception of the bowel from a sheep-dog puppy and enquired how long an animal might live with the condition. In this case the animal had been ill from May 7th and was destroyed on the 16th.

Mr. Thompson (Sheffield) said that in one case, in which Mr. Pillers and he successfully operated, the dog used to sit up as if begging and the intussusception could be felt *per rectum*, but he could not state how long an animal so affected would live.

The President exhibited the kidneys of a cat which were very pale in colour, and the Hon. Secretary suggested that the animal had suffered from nephritis. He also showed sinus material surrounding cotton-wool swabs which had been soaked in 10-15 per cent. zinc chloride to cause sloughing from cases of fistulous withers.

Mr. Green showed a foal's head with no upper jaw and one eye, and also a very good specimen of a bulldog calf from a Kerry cow. He also exhibited a wire, supplied by the Holborn Surgical Instrument Company, which he had found of great value in embryotomy, and McLean's instrument for teat operations, with which he had had success.

Mr. Nixon (Sheffield) recommended the injection of 5 c.c. of phylacogen in purpura of the horse. The intradermal tuberculin test in the horse was found very reliable in his hands. He mentioned a condition of the horse where the animal lost the sense of direction, as though there was brain trouble, and which responded to treatment by stimulants. He had met with outbreaks of pneumonia in horses which were not associated with influenza and asked if there was an infectious type. The lungs were very œdematous, the horses discharged profusely at the nose, and the condition was often fatal.

The speaker next mentioned that malignant growths often produced acute pain: in one case a pony developed acute abdominal pain and died, and on *post-mortem* the left kidney was very enlarged and affected with sarcoma.

Proceeding, Mr. Nixon described a case in a horse where acute lameness occurred periodically, with enlargement of one or other of the joints, and which, on recovery, would later become affected in another joint. This occurred over a period of 15 months until the horse was destroyed.

* Received for publication, December 9th, 1933.

In conclusion, he described a case of a dog, with impaction of the rectum, which had passed nothing for a fortnight. It was three weeks later before normal passage was obtained and the dog recovered.

Mr. Hudson (Retford) said that he saw some cases of purpura after foaling and he found the best treatment to be formalin given intravenously: he had not had the same success with Lugol's solution injected into the trachea. He had a case where it was not possible to move a horse which appeared to have had brain trouble; recovery took place in two or three days after a physic ball had been given and potassium nitrate administered. Pneumonia in horses, when there were several affected, was usually associated with defective ventilation. The metastatic synovitis case was interesting, and one case he had seen recorded in East Africa had no definite causal factor.

Mr. Scott (Pontefract) said that in some cases of indefinite lameness (mentioned by Mr. Nixon) the animal, when slaughtered, showed partial twist of the bowel, this setting up absorption of toxic products from the bowel. In purpura there was always danger of hæmorrhage, from passing the stomach tube, which was difficult to arrest. Stiffness was a very good symptom in tuberculosis of the horse, but one might only get the respiratory type.

Mr. Murgatroyd (Sheffield) mentioned that one got a variety of symptoms in dogs which had swallowed foreign bodies. Hysteria, he said, often occurred from a foreign body, and he gave as examples a dog which swallowed a stone and another with a needle and thread lodged in the rectum, which showed these symptoms. He dislodged the needle and thread by means of an enema, which brought the thread through the anus. The speaker quoted the case of a dog which retained a half-crown in its stomach for eight years. Foreign bodies often lodged at the site of the first rib in dogs and, in his experience, if olive oil would not dislodge them the probang would not.

Proceeding, Mr. Murgatroyd observed that he once had a horse which had acute colic and got better within twelve hours, and repeated this six times at short intervals. The owner asked him to get another opinion, and the second opinion was the suggestion that the horse had pneumonia. The horse never had another attack and lived for 15 years after, and the owner always said that the second opinion he obtained cured the horse.

Mr. Murgatroyd next recounted a case of a dog in which one ear first became necrotic and dropped off and then the other and finally its tail: he wondered if diabetes was the cause. He had a colt which showed typical symptoms of being broken winded, which recovered after turning out to grass, though he never saw a worse case. He had seen animals with very acute lung symptoms recover after intervals of hours. In these cases the cause was often indefinite, and he thought it must be some nervous condition.

Mr. Fletcher said that some years ago they used to get cases of "bellon" in horses on pasture round lead mines in Derbyshire, which showed as attacks of asthma followed by recovery between the attacks.

Mr. Scott suggested that valvular disease of the heart in horses could produce lung symptoms. He had met with cases in hunters which seemed to recover when there was compensating hypertrophy of the heart muscle, and wondered if it had been the experience of any of the members to meet with such a case, in which later the horse could be passed sound.

Mr. Thompson recalled the case of a schoolboy who had grown too quickly and who, when running, used to blow like a broken-winded horse and have to stop. The condition was due to heart trouble, which later disappeared. He thought the cases of "bellon" in horses usually developed into roarers, as in cases of poisoning by dog-tooth pea.

Mr. Murgatroyd said at one time a man he knew bought roarers and tubed them and in six or eight months removed the tube and sold them, as the roaring had passed off.

Mr. Hudson observed that he once had a mare which commenced suddenly to roar when being ridden and was always a whistler afterwards. In Mr. Murgatroyd's case he thought it was a case of acute emphysema and that, if bulky food was avoided and the animal turned out to succulent pasture, it would improve.

Mr. Fletcher stated that in cases of hæmorrhage in dogs from torn ears, etc., he found that a large dose of morphine was the most effective means of arresting the hæmorrhage.

Mr. Collinson mentioned that atropine and calcium were useful drugs for arresting hæmorrhage.

Mr. Green said that he once tried to destroy a dog and gave it 8 grs. of morphia but failed to do so. He remarked on the large doses of this drug which could be given to a dog.

Mr. Collinson stated that the injection of gr. i morphia, followed, when the dog was under its influence, by the intra-nasal injection of a syringeful of chloroform, was a good method of destroying dogs.

Votes of Thanks.—A hearty vote of thanks was passed to Messrs. Nixon and Murgatroyd for their contributions, which were much appreciated by the members present.

This meeting concludes the series of clinical discussions which were opened by two practitioner members of the Division in rotation at each meeting, and which have proved of great value and aided the Hon. Secretary in arranging meetings of the Division.

William Tweed, *Hon. Secretary.*

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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DIARY OF EVENTS

Jan. 15th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4.30 p.m.

Feb. 2nd.—Annual Meeting of the Royal Counties Division, N.V.M.A., at Reading.

July 30th-Aug. 3rd, 1934.—National Veterinary Medical Association Congress, Edinburgh.

Aug. 13th-18th, 1934.—Twelfth International Veterinary Congress, New York.

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Personal

Retirement of Mr. J. W. McIntosh, F.R.C.V.S., F.R.S.E.

Champion of the Commercial Horse Leaves Hay's Wharf

The New Year witnessed the severance—and we know with what mutual regret—of the almost 30-year-old connection of our esteemed ex-President, Mr. J. W. McIntosh, F.R.C.V.S., F.R.S.E., with that great London transport firm, Hay's Wharf Cartage Company, Ltd., whose interests have now been acquired by the Combined Railways.

It is a pleasing irony that perhaps the staunchest supporter of the commercial horse in the struggle to keep that still indispensable animal on the streets of London should be a Highlander. Yet this will be no matter for surprise to those who, having the privilege of knowing John W. McIntosh, know also that he is generously endowed with the courage that conviction brings and will fight "to the last ditch" for any cause that he espouses—be that for the establishment of an association of professional colleagues, or the well-being of the noblest of our "lesser brethren." Of the latter, the Clydesdale is his especial pride and care, and in leaving Hay's Wharf, Mr. McIntosh has the supreme satisfaction of knowing that the great stud he has had under his professional charge, and which at one time numbered close on 3,000 horses, has throughout that long period provided consistent proof that he stands unrivalled as an authority on the feeding and management of transport animals. Indeed, the degree of perfection attained by the Hay's Wharf stud, and its record of work on the streets of the City and its environs are well known, and lend eloquent support to the contention of this lover of the Clydesdale that animals of this breed are the most readily adaptable for the varied purposes associated with general transport.

When, in 1908, Mr. McIntosh relinquished his extensive practice at Dalkeith, Midlothian, and accepted the Veterinary Advisership at Hay's Wharf, his reputation both as a judge of the commercial horse and as an expert in feeding and general management was already firmly established. The unrivalled opportunity for its enhancement was utilised to the full, as is exemplified by the following testimony paid to the quality and character of his work by Dr. L. Panisset, Professor of the Alfort Veterinary School, and his colleagues of the French Ministry of Agriculture, subsequent to a visit paid in 1921. "It is my agreeable duty," wrote Professor Panisset, "on my return to thank you for the welcome you so kindly gave us at Hay's Wharf. We admired equally the choice of horses you have and the good condition they were in. My companions, who are breeders specially of Percheron horses, have asked me to be their mouthpiece, in order to address to you their thanks and congratulations; they praised unreservedly the knowledge you have of horses in general, and of all those at Hay's Wharf in particular. I can only add to these compliments my very cordial thanks."

During his sojourn in London, Mr. McIntosh has, indeed, successfully accomplished the dual task of setting the highest possible standard of commercial horse management and stemming, to the best of his power, the tide of disparagement of all things equine which stands to the discredit of those interested in the marketing of mechanical means of transport. While, therefore, we are very glad to know that it is not Mr. McIntosh's intention to retire altogether from professional activities, but that his services will now be available in an advisory capacity, we are even more grateful for the prospect of his being able to devote yet a larger measure of the time he has hitherto so generously given under difficult circumstances, to the cause which he has so much at heart.

We understand that it is Mr. McIntosh's intention to settle down at his beautiful old home in Middlesex, and it will, we are sure, be the wish of the profession that he may be long spared to enjoy, in health and happiness, his well-earned leisure.

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Complimentary Dinner to Professor G. H. Wooldridge, F.R.C.V.S.

We have pleasure in announcing that on December 22nd, 1933, Professor G. H. Wooldridge was entertained at dinner by his immediate colleagues, to celebrate the completion of 25 years' service on the teaching staff of the Royal Veterinary College, London. Sir F. T. G. Hobday, Principal of the College, was in the chair. A second guest on this occasion was Sir Arnold Theiler, K.G.M.G.

After a brilliant career as a student at the London College, where he took First-class Honours in the final examination in 1899, Professor Woldridge was Tutor in Medicine until 1900, when he became Professor of Veterinary Science and Bacteriology at the Agricultural College, Cirencester, till 1903. Thence he proceeded to the Veterinary College in Dublin, where he was the first Professor of Medicine until 1908. In 1908, he returned to the London College as Professor of Veterinary Hygiene and Materia Medica, and in 1913 he became Professor of Medicine, a chair which he still holds.

A Hunting Accident.—While hunting with the Cottesmore, on December 27th, Mr. George Gibson, M.R.C.V.S., of Highfield, Oakham, had the misfortune to sustain a complete dislocation of the knee, his horse rearing and falling across his leg. Mr. Gibson was taken to hospital, and is now progressing satisfactorily.

On Leave.—We were pleased to welcome amongst our visitors to the N.V.M.A. Offices last week, Mr. Frank Ware, F.R.C.V.S., Director, Imperial Institute of Veterinary Research, Muktesar-Kumaon, who is home on leave.

Also on leave is Mr. Allan J. James, M.R.C.V.S., Veterinary Officer, Vom, Nigeria.

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R.C.V.S. OBITUARY

Walker, John Malcolm, "Orchardleigh," New Street, Ledbury, Herefordshire. Graduated New Edinburgh, December 22nd, 1896; Fellow May 20th, 1905. Died January 4th, 1934, aged 59 years.

The Late Mr. R. C. Holmes

Mr. Reginald Charles Holmes, of 29, Truro Road, Wood Green, whose death at the early age of 33 years, was reported in our last issue, had built up a considerable practice there. He was a recognised expert on questions relating to farriery, and was an examiner to the Worshipful Company of Farriers.

Mr. Holmes belonged to the Ravenscroft Lodge (No. 2331) of Freemasons, and Masonic honours were paid at the funeral service at Totteridge Parish Church, by the officers and brethren of the Lodge. Among those present at the service were Dr. Fred Bullock (representing the Royal College of Veterinary Surgeons), and Professor J. McCunn (Royal Veterinary College).

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IN THE COURTS

Alleged Cruelty to Rabbits at a Greyhound Racing Track.—At Greenwich Police Court recently the Magistrate imposed a fine of £10 upon Herbert Leonard Blann, of Rubens Street, Catford, Co-manager of the Perry Hill, Forest Hill, Greyhound Racing Track, for cruelly ill-treating "certain captive animals."

The case for the prosecutors—the R.S.P.C.A.—was that a cord was tied to the neck of three live rabbits, and that the free end was attached to a football which was drawn round the track by a cable worked by a motor. The rabbits were pulled off their feet as the speed accelerated, and the greyhounds, being liberated, overtook the animals and killed them.

The defendant's case was that the rabbits were killed before being fixed to the ball, and after the carcasses had been mauled they were cut open and the warm liver thrown to the dogs to give them the impression that they had killed the rabbits. Furthermore it was stated for the defence that the carcasses inspected by the society's veterinary surgeon were the "wreckages" of rabbits coursed by a head kennelman some time previous, and for this action he was discharged.

Mr. Theodore Elman, the solicitor defending, gave notice of appeal, and the Magistrate suspended the payment of the fine for six weeks.

A Swine Fever Case.—At Chester Castle Petty Sessions, on December 27th, Aaron Bailey, of 4, Queen Street, Chester, was told by the Magistrates that it was hard to believe that he did not know that swine fever existed amongst his pigs, that he was liable to a fine of £50, but that he would be "let off lightly" with a fine of £3 3s., with £2 4s. 10d. costs.

P.S. Worrall said that Captain Maloney, the Ministry of Agriculture Veterinary Inspector, called on him and made the complaint. Witness visited the defendant's premises at the Loon Fields, Guilden Sutton, and cautioned him, adding that he was making inquiries relating to suspected swine fever among seven store pigs purchased at an auction on October 17th. The defendant, in a statement, said the pigs started scouring. He killed and burned three, and killed and buried the others. He did not inform the police because he thought he was doing right. There were twelve healthy pigs on the premises.

Captain Maloney stated that he examined the buried pigs, and found that one was affected with swine fever.

In reply to Superintendent Morgan, witness said that scour was one of the main symptoms of swine fever among pigs. The majority of pig-keepers knew when the disease was present.

The defendant told the magistrates he was very sorry for what had occurred. He did not know that the pigs had the disease, or he would not have had them with his stock on the premises. He had a good stock of pigs, and was unaware that the pigs had the disease.

Superintendent Morgan: The division is full of swine fever, and we are having a terrible time with it. The action of men like the defendant spreads it.

The Chairman told the defendant that the magistrates looked upon it as a serious case.

Man who "Stole Cats for Food."—John Faulkner Smith, 25, a blacksmith, who told the Recorder at Birmingham that he stole cats for food, was sentenced on Tuesday to twelve months' imprisonment, with hard labour, for stealing a bicycle. Pleading for leniency, Smith said he had no money when released from prison after his last sentence and went round stealing cats. He boiled them for food. He said that his wife would not eat boiled cat, and that she had now been taken away with diphtheria, while his child was also ill.

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PARAGRAPHS FROM THE PROVINCES

Glasgow's veterinary surgeons have been working day and night for the past fortnight to cope with a serious outbreak of influenza among the city's cart-horses.

A strange epidemic among animals has broken out at Ovington, a few miles west of Newcastle, in the Tyne Valley. Horses, cats and poultry have died suddenly. Sixteen cats have died in three days. A farmer lost three of his best

draught horses, and a horse suddenly dropped dead while drawing a load of timber. A poultry keeper has lost four prize Rhode Island pullets. Investigations are being made.

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Within a very short period 15 cows have died at Bonhueck Farm, Loch Awe Side, Argyllshire. Veterinarians in charge of the cases at first suspected anthrax, but it is now believed that arsenical poisoning is the probable cause of death. Parts of the organs of the dead cattle have been sent to London for analysis, and the result is expected to be known shortly. An examination made by experts of the suspected oil cake food of the cattle revealed no trace of arsenic.

The Argyllshire police are also carrying out investigations.

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The Dorchester police stated on Monday that they are satisfied that the rooks and jackdaws found dead in large numbers in the Melcombe Horsey district last week were poisoned by strychnine in raw animal flesh put down to kill vermin.

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HEAVY HYDROGEN

The rooms of the Royal Society were crowded recently for a discussion on heavy hydrogen, the newly-discovered form of hydrogen. The discovery, which was characterised at this meeting as one of the most important of the present century, is of interest not only for physics and chemistry, but for botany, physiology and medicine.

Dealing with this subject under the heading of "Heavy Water," *The Pharmaceutical Journal* states: "The existence of an isotope of hydrogen of approximately atomic mass 2 was suggested in 1931, and the partial separation of this isotope was achieved in 1932. It was at first thought that this would explain the atomic weight of ordinary hydrogen being 1·0078, but later work has shown that there is an insufficiency of the heavy isotope present in ordinary hydrogen to satisfy this figure. The presence of an isotope of hydrogen necessitates the existence of compounds of hydrogen containing this isotope, and hence there should be a water which differs from ordinary water in that its component hydrogen is of the heavy variety. Lewis and MacDonald have now achieved separation of this heavy water, and experiments on its physical properties were carried out on as little as 0·12 mil. It will be interesting to compare these values with the corresponding figures for ordinary water.

"The freezing-point of this 'heavy water' is + 3·8°C.; boiling-point 101·42°C.; density at 25°C. 1·1056; temperature of maximum density + 11·6. Its latent heat of evaporation is higher by 3 or 4 calories per molecule. Lewis has suggested that this new type of water would be unable to support life, that it would be toxic towards the higher organisms. It has already been demonstrated that tobacco seeds would not germinate when moistened with it, but no results have been published as to whether seeds which had been moistened with the 'heavy water' were permanently injured. A further preliminary report indicated that heavy water is lethal to fish, tadpoles and worms."

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FUTURE OF LONDON QUARANTINE STATION

At a conference held on Tuesday, at the Ministry of Agriculture, between representatives of the Breed Societies, the Royal Agricultural Society, and officers of the Ministry, on the future arrangements for continuing the London Quarantine Station for exported pedigree stock, the report of the committee appointed by the previous conference in November, to examine financial and other details in consultation with the Ministry, was considered and unanimously adopted by the societies' representatives.

The recommendations in this report will now be considered by the Government, whose decision will be announced in due course.

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DEATH OF OLDEST DOCTOR IN EUROPE

The Milan Correspondent of *The Times* reports that Dr. Giovanni Gortani, the *doyen* of European medical men, died at Terzo d'Aquileia, in Venezia, on New Year's Day, at the age of 107.

Giovanni Gortani was born in the Carnia mountains, and followed his profession up to the age of 90. He was a specialist in the cure of malarial fevers.

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ARMY VETERINARY SERVICE

Half-Yearly Brevets

The list of names of officers promoted to be Bt. Lieut.-Colonels (January 1st) contains that of Major J. J. M. Soutar, O.B.E., R.A.V.C.

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Erratum.—In the abstract published last week of the paper by Elford and Galloway entitled "Determination of the Size of the Virus of Louping-ill of Sheep by the Method of Ultra-filtration Analysis" (col. 1, p. 20) the size of the virus is given as so many μ. This should read so many $\mu\mu$.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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THE SCULPTOR FOR THE HAIG MEMORIAL

To the Editor of The Veterinary Record.

Sir,—With reference to and in elaboration of the last paragraph of the review on Captain Adrian Jones's "Memoirs of a Soldier Artist," published in your issue of December 30th, 1933, it goes without saying that a sculptor who is entrusted with a National Memorial of an equestrian nature, should have that intimate knowledge of anatomy which is necessary to outline the true form and figure of the horse as well as the combination of horse and man. In all Captain Adrian Jones's statues we see this remarkable effect: it is second nature to him. On this account, it is my personal opinion, and the opinion of a good many others outside the veterinary profession, that the execution of the Memorial to the late Earl Haig, whom the country has thought fit to honour in perpetuity, should have been placed in the hands of Captain Adrian Jones who, without question, would have given to posterity something worthy of the name of a Memorial. It is all very well for Ministers of State to argue on the principle that the most fitting type of Memorial to Earl Haig should be allegorical. From personal knowledge of my most revered Commander-in-Chief I can truly assert that there was little of the allegorical about him, that he was by nature true and honest of

purpose, with an abounding regard and sympathy for the horses of the Force serving under him, and it is in that essentially correct attitude and spirit he should be remembered. I have in my possession a photograph of him, taken on the occasion of the Victory March in London after the cessation of hostilities in France. It shows exactly the manner in which he always sat on his horse, and how, when he was Inspector-General of Cavalry in India, he was careful to explain to others—*viz.*, the leg straight from the knee downwards. I consider that this photograph, taken by the Central News Agency, should have formed the basis for the design of the Memorial, as it is correct in every detail. Even the horse was named "Haig" in the Royal Mews. It is also much to be regretted that this photograph was not in the possession of the French artist and designer of the statue erected at Montreuil. The horse of that Memorial is not so bad, but the attitude of Earl Haig on the horse is incorrect, his leg being drawn right back, and in other ways not being characteristic of him, or, as expressed to me by his Chief-of-Staff, "I cannot see D.H. in it at any angle."

I think it is most necessary that our National Memorial to the late Field-Marshal who saved our Country and Empire should embody a faithful representation of the man as he was, and that the ensemble should be in accordance with that due spirit of correctness which he himself would have desired. Captain Adrian Jones most certainly would have caught that spirit. It is not known to what stage the Memorial has yet been brought. It may still be possible to elicit the services of Captain Adrian Jones, who, I understand, has already produced an appropriate design.

Yours faithfully,
JOHN MOORE (Major-General).

16, Frognal Lane,
Hampstead, N.W.3.
December 31st, 1933.

A "TUMOUR" PROBLEM

TO THE EDITOR OF THE VETERINARY RECORD.

Sir,—Some months ago, in July, to be precise, I was asked to go and operate on some "tumours" that were forming on either side of the girths of a three-year-old thoroughbred gelding. The owner thought that they were the result of over-girthing in his "breaking-tackle."

Examination shewed two more or less definite growths about the size of a walnut, above the spur vein, and I removed them with a local anæsthetic, noticing that they were apparently made up of cirrhotic tissue, with a tiny centre of what appeared to be pus.

The operation wounds healed well, and the horse did well for about four months, when the "tumours" were again seen to be growing, and I was asked to have another look at the horse, when next in the district. As the case is at some considerable distance from my surgery I was only able to do this recently, when I was surprised to find that the "tumour" on the off-side had returned and had reached the size of a good-sized apple, and the one on the near side had appeared higher up, and was as big as a walnut again. What mystified me more was to notice others forming at the flanks, shoulder-points, and under the angles of the jaws, each varying in size from that of a walnut to that of a pea.

I frankly adopted a waiting policy, but I wonder if any other practitioner can suggest a remedy. I presume we are dealing with some abnormality at the vortices of the hair streams at these sites, but what is the cause, and what is the remedy—the knife having proved, so far, to be unsuccessful?

A few opinions would be appreciated.

Yours faithfully,
H. W. BREKKE.

East Mount,
Malton, Yorks.
January 6th, 1934.

Diseases of Animals Acts, 1894 to 1927

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 16th to 31st Dec., 1933	19	21	—	—	4	9	54	49	10
Corresponding period in									
1932	17	22	7	1,237	6	18	54	43	24
1931	23	25	—	—	5	6	45	114	70
1930	30	37	—	—	12	16	39	77	28
Total 1st January to 31st December, 1933	297	345	87	7,806	132	225	566	1,414	900
Corresponding period in									
1932	344	418	25	2,659	127	204	361	1,555	757
1931	465	516	97	10,649	138	237	347	2,026	902
1930	392	446	8	306	201	300	478	2,408	1,071

NOTE.—The figures for the current year are approximate only.

§ Excluding outbreaks in Army Horses.